Beckman Part No. 609912-AA
April 1998

Biomek® 2000

Tutorial Guide

BECKMAN

Beckman Instruments, Inc.
2500 N. Harbor Blvd., Fullerton, CA 92834-3100

Copyright, Licenses and Trademarks

Copyright

The product warranty does not apply to software which is warranted on an “as is” basis without fitness for any specific purpose with the exception of the media which is warranted against defects in materials and workmanship for a period of one year.

The software is copyrighted and may not be altered or given to a third party without the written authorization from Beckman Instruments.

Table of Contents

Notice

Safety Notice

Introduction

Exercise 1

Exercise 2

Exercise 3

Exercise 4

Exercise 5

Exercise 6

Summary

Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference with the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the used will be required to correct the interference at his own expense.

Safety Notice

The exclamation mark (contained in a triangle) is an international symbol displayed to indicate to the user that all safety instructions should be read and understood before installation and operation are attempted.

When you see the safety notice symbol on the instrument or on one of its accessories, you should refer to this manual for specific safety information that applies. If the product is used in a manner other than specified in the manual, the safety and performance of the equipment could be impaired.

Any installation or service procedures not described in this manual must be performed by qualified service personnel.

Safety During Installation

Do not lift the Biomek 2000 by the bridge. Two people are needed to lift the Biomek, grasping the front rail and the back support.

Do not connect the Biomek to an electrical outlet until it is positioned properly on the bench.

Electrical Safety

To reduce the risks of electrical shock, this equipment employs a three-wire electrical cord and plug to connect the equipment to earth ground. To preserve this safety feature:

- Make sure the matching wall outlet receptacle is properly wired and earth grounded.
- Never use a three- to two-wire plug adapter
- Never use a two wire extension cord or a non-grounding type multiple outlet receptacle strip
- Any servicing of this equipment which requires removal of any covers or panels can expose parts which involve the risk of electric shock or personal injury. Refer such servicing to Beckman-trained, qualified personnel
- Do not use any power supply other than the type supplied for the accessory for the Biomek 2000, as appropriate for the country where it is installed.
-

Safety Against Risk of Fire

Certain electrical circuits within this equipment are protected by fuses against over-current conditions. For continued protection against risk of fire, replace fuses only with the same type and rating specified.

Chemical and Biological Safety

Normal operation of this equipment sometimes involves the use of reagents which are toxic, flammable, or biologically harmful. When using such reagents, observe the following precautions:

- Infectious samples must be handled according to good laboratory procedures and methods to prevent the spread of disease
- Observe all cautionary information printed on the original solution containers prior to their use
- All waste solutions must be disposed of according to your facility's waste disposal procedures
- Liquid transfers may generate aerosols. **Operate the Biomek in an appropriate enclosure and take all necessary precautions when using biohazardous, pathologic, toxic, or radioactive materials**
- Objects dropped onto plates, accidental tool release, or other accidental collisions may result in splashing of liquids; therefore take appropriate safety precautions, such as the use of safety glasses when working with potentially hazardous liquids
- Use an appropriate containment environment when using hazardous materials
- Observe the appropriate cautionary procedures as defined by your safety officer when using flammable solvents in or near a powered-up instrument
- Make sure that the vacuum is attached prior to any method that contains any wash or aspirate functions

Moving Parts

The bridge and head assembly may suddenly move. To avoid injury due to moving parts, you must observe the following:

- Never attempt to exchange labware, reagents, or tools while the instrument is operating, as indicated by the amber safety light at the end of the bridge. When the light is on, the workstation is in operation and may move suddenly and rapidly at any moment. A beep sounds just prior to initial movement to provide additional warning
- Never attempt to physically restrict the movement of the head and bridge assembly. Use the Stop switch at the base of the workstation if an emergency stop is required. Pressing this switch will freeze the workstation (but not the Side Loader). Click on the Stop button on the Run window to stop the instrument if the stop is not an emergency

- Because the parts of the Biomek move automatically, keep clear of the head assembly during operation. Also, keep the area around the workstation clear (including the expansion area) to prevent obstructing the movement of the instrument
- Always check the position of the tools and labware before beginning any stage of the method to ensure that their locations on the worksurface match those given on the window. Also, check that the labware is properly seated on the worksurface before beginning an operation.

Cleaning

You may clean the spill trays of the Biomek worksurface and the nozzles of the Wash tools. Please observe the following precautions:

- Be careful when handling the Wash tools as the nozzles are sharp.
- Contact your laboratory safety officer and refer to the guidelines in the section titled "Chemical and Biological Safety" if you will be cleaning spill trays that may have been exposed to hazardous solutions.

Maintenance

- Turn the POWER off and UNPLUG the Biomek before changing fuses or performing any maintenance.
- Do NOT autoclave Pipetting or Wash tools; autoclaving may cause damage to the internal parts.

  Perform only the maintenance described in this manual and in the Biomek 2000 Maintenance and Troubleshooting Guide. Maintenance other than specified in these manuals should be performed only by Beckman-trained, qualified personnel.

  It is your responsibility to decontaminate components of the Biomek before requesting service by a Beckman Field Service Representative or returning parts to Beckman for repair. Beckman will NOT accept any items which have not been decontaminated where it is appropriate to do so. If any parts are returned, they must be enclosed in a sealed plastic bag stating that the contents are safe to handle and are not contaminated.

- Do not replenish bleach in a sterilization reservoir using the aspirate and bulk dispense transfers, as the bleach may damage the Wash tool.

Accessory Safety

Follow the appropriate safety instructions for the accessories listed below in addition to the standard safety precautions for the Biomek 2000.

Side Loader (SL)

Verify that the voltage selector is set for current voltage by a Beckman Representative at the time of installation.

- During method operation, DO NOT touch, change, or otherwise interfere with labware on the worksurface, stacks, or in the SL hand unless the system tells you to.
- The arm can move suddenly. Stay clear of the arm and hand during operation.
- Keep the area around the SL clear of any obstructions to avoid collisions.
- There is a Stop switch at the base of each Stack Area. If an emergency stop is required, pressing this on each stack area of your SL switch will freeze the SL instantly.

  CAUTION

  The Stop switch on the SL will not stop the workstation, nor will the Stop switch on the workstation stop the SL.

  NOTE:

  You may lose data and be forced to quit the run in progress if you press the SL Stop switch. Use of the SL stop switch may result in spillage or splattering of liquids in transit. Click on the Stop button on the BioWorks Run window to stop the instrument if it is not an emergency.

SL Incubator

- Operating the incubator at 4° C for longer than twenty-four hours may result in ice formation within the chamber, adversely affecting temperature equilibrium and assay results.
- Do NOT place the incubator in stack location "C" as the incubator may inhibit access to the Stop switch of the SL in the event of an emergency.
- Allow enough time for the incubator to reach the desired temperature to ensure reliable assay results (typically less than one hour, depending on the circulator and desired temperature).
- Use 50% polyethylene glycol and 50% water as the conductive fluid in the water circulator.
- Maximum inlet pressure to the SL Incubator is 5 psig (34.5 kPa).
- When cleaning the incubator wear protective gloves and eyewear.

High-Density Replicating System

- The High-Density Replicating (HDR) System is not autoclaveable, nor should you use organic solvents to clean the system. However, you can autoclave the pins of the HDR Tool and use organic solvents to clean the pins.
- If you are using the bleach tray within the tool holder, remove the HDR Tool from the bleach tray and rinse thoroughly after each session. Do NOT store or let the HDR Tool stand in the tool holder with its pins immersed in bleach when not in use. Extended contact with bleach will result in corrosion of the metal pins.

Plate Reader

Refer to the Plate Reader User's Manual from the original manufacturer (Molecular Devices Corp.) for maintenance and service information.

- There are no user-serviceable components under the cover. Change lamps only with the power off.
- Never touch any of the fiber optic cables or their housing, manifold, or rotor connections. These fibers are extremely delicate and critical to the performance of the Plate Reader.
- Use only the tools described to perform the steps defined in the Plate Reader user's manual.
- Do not touch or loosen any screws or parts other than those specifically designated in the instructions of the Plate Reader user's manual. Doing so could cause misalignment and possibly void warranty.
- Never perform any operation on the Plate Reader in an environment where damaging liquids or potentially damaging gases are present.
- Never touch the surfaces of the interference filters or optical lenses.
- DO NOT install the Plate Reader in a stack location that could inhibit access to the Stop Switch of the SL in the event of an emergency. Use only locations 1F1 or 2F1 on the SL.

To prevent fluid from dripping off the microplate when it is in the reading chamber onto any sensitive optical elements, and to minimize potential biohazard exposure to other Plate Reader users, observe the following precautions:

- When reading microplates that may have fluid on the underside of the microplate, damp-dry the underside using a dry paper towel (or equivalent) before putting the microplate on the drawer. Alternatively, place a clear sheet (such as a Molecular Devices blanking template) underneath the microplate when inserting it in the drawer.

Wash System

- Never run the 6-Port Valve dry. Liquid should always run through the 6-Port Valve. Failure to do so can result in damage to the valve.
- Strong acids, strong bases, oxidizers, radioactive and biohazardous liquids should not be run through the Wash Unit. Each laboratory must qualify this instrument with its unique application(s).
- Plug any unused port with the plugs provided with the 6-Port valve. Otherwise liquid may spill through exposed ports when the 6-Port valve is used.
- When using a Wash tool, make sure a quarter reservoir is installed properly in the support block under the tool.

Heater/Cooler Block

- Failure to provide cooling water to the Heater/Cooler Block (HCB) will cause excessive and potentially dangerous heating of the assembly. DO NOT operate the assembly without adequate water flow (1 to 2 liters/minute).
- Full power time-out faults may be caused by loss of cooling water. Should this occur, the Heater/Cooler Block assembly may be hot.
- Always be sure to shut down the HCB as the last command of each heating/cooling sequence. Include a shut down command in all Biomek routines. Provided water cooling is maintained, extended cooling operations do not adversely affect block life span. The TEMP command may not permanently turn off the block if a programmed event list is executing.

Biomek 2000 Safety Features

The Biomek 2000 workstation is equipped with several safety features. A Stop switch is located on the front of the instrument. Press this switch to stop the Biomek. Also the warning light at the top of the bridge warns you that the instrument is operating, and emits a beep before the initial movement in a method. When this light is on do NOT attempt to change labware.

Summary of Warning Information

This manual is provided to help you establish safe conditions for performing the maintenance and servicing of your equipment. Specific considerations and precautions are also described in the manual, but appear in the form of Warnings, Cautions, and Notes.

It is important that you service your equipment in accordance with this instruction manual and any additional information which may be provided by Beckman. Address any questions regarding the safe and proper maintenance and servicing of your equipment to your nearest Beckman Sales and Service Center.

Chapter One 1

Introduction

Preface

Welcome to the tutorial phase of the Beckman Training Program for the Beckman 2000. By now, you should have been introduced to the basic instrument functions by a Beckman field engineer during the installation of the Biomek 2000.

The purpose of the tutorial is to help you to become comfortable with the basic functions of the Biomek 2000, and to introduce you to some of the more advanced functions.

This tutorial comprises five (5) self-paced exercises that increase in their level of difficulty. Do not proceed to the next exercise until you are comfortable with all of the functions that are covered in the current exercise, as each successive exercise builds on the knowledge gained in the preceding exercise.

The exercises are as follows:

Exercise One:	Creation of a Default Configuration
Exercise Two:	Pipette Transfer
Exercise Three:	Pipette Transfer with Pauses, Loops, and Marks
Exercise Four:	BioWorks Device Functions: Vacuum Manifold and Plate Reader
Exercise Five:	Labware and Tool Edit

Chapter Two 2

Exercise 1

Exercise 1: Creation of a Default Configuration

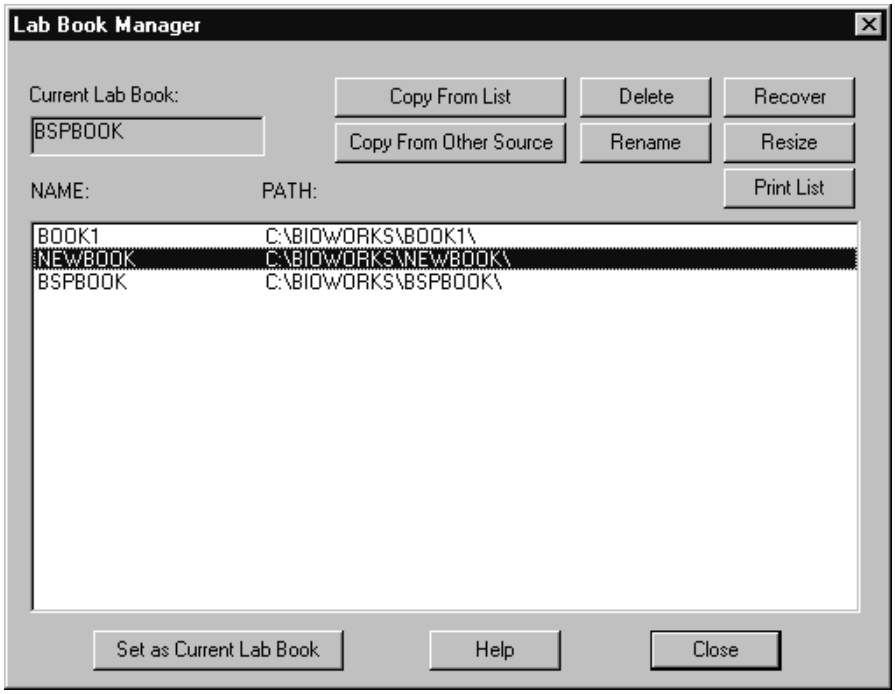
In this exercise, you will become familiar with the method build window of BioWorks Edit. You will build, validate, and save a Default Configuration that contains tools, reservoirs, tip racks and plates on the worksurface.

The objectives of this exercise are to:

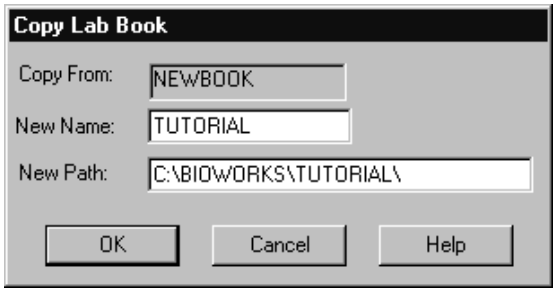
- Identify the components of the BioWorks Method Edit window.
- Modify the worksurface "Setup."
- Place tools and labware on the worksurface.
- Save a method as the Default Configuration.

Locate the BioWorks Program Group, then double-click on the **Lab Book Manager** icon.

This displays the Lab Book Manager window. To create a new lab book for use in this tutorial, select **Newbook** from the list of installed lab books, then click **Copy From List:**

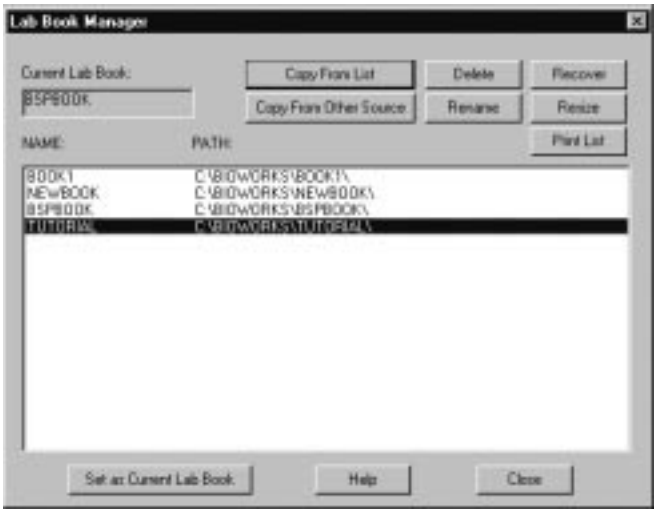


When the Copy Lab Book dialog is displayed, enter the name **"Tutorial"** for the New Name, and specify a path as shown:



Click **OK**. The contents of the source lab book is then copied into the new lab book, and the new lab book, Tutorial, is shown in the list of lab books.

Select **Tutorial** as the Current Lab Book, by highlighting **Tutorial** from the list, then clicking the **Set as Current Lab Book** button:

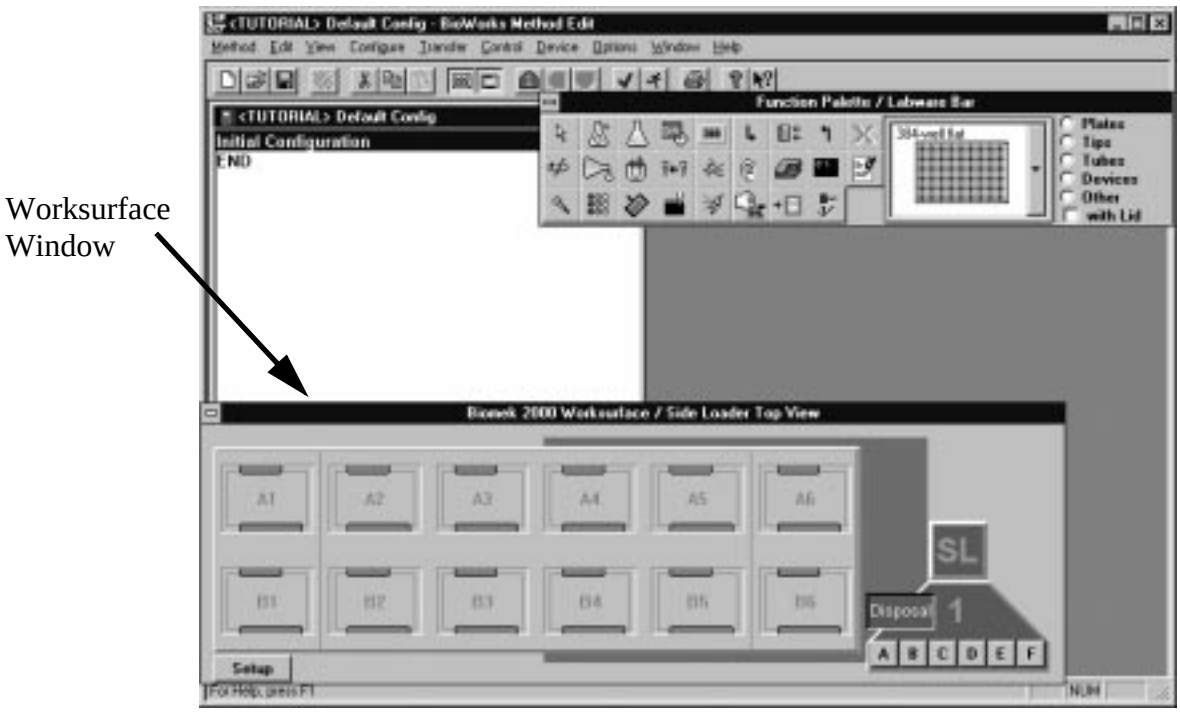


Close the Lab Book Manager by clicking the **Close** button.

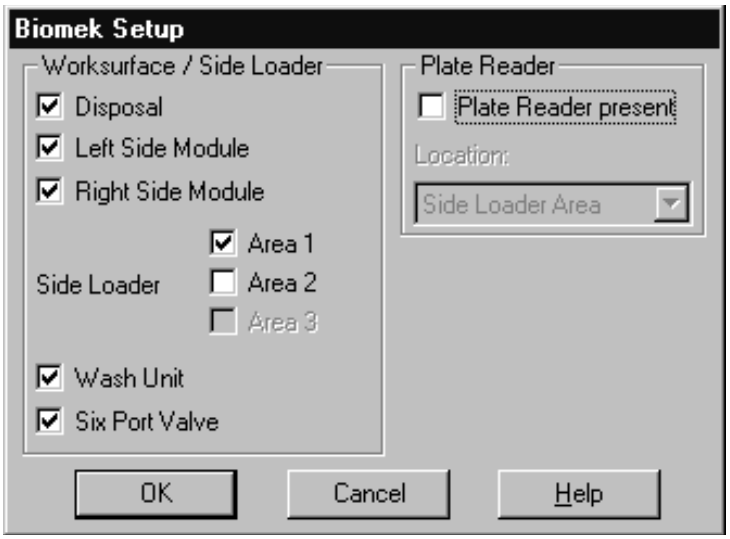
Now that we have a new Lab Book to work in, we will use the Edit module to build a method. Double-click on the **Edit** icon button to access "BioWorks Method Edit."

Click **Options** in the menu bar, then select **Default Configuration**.

When the Default Configuration is displayed, click the **Setup** button on the Worksurface window to configure the Worksurface.

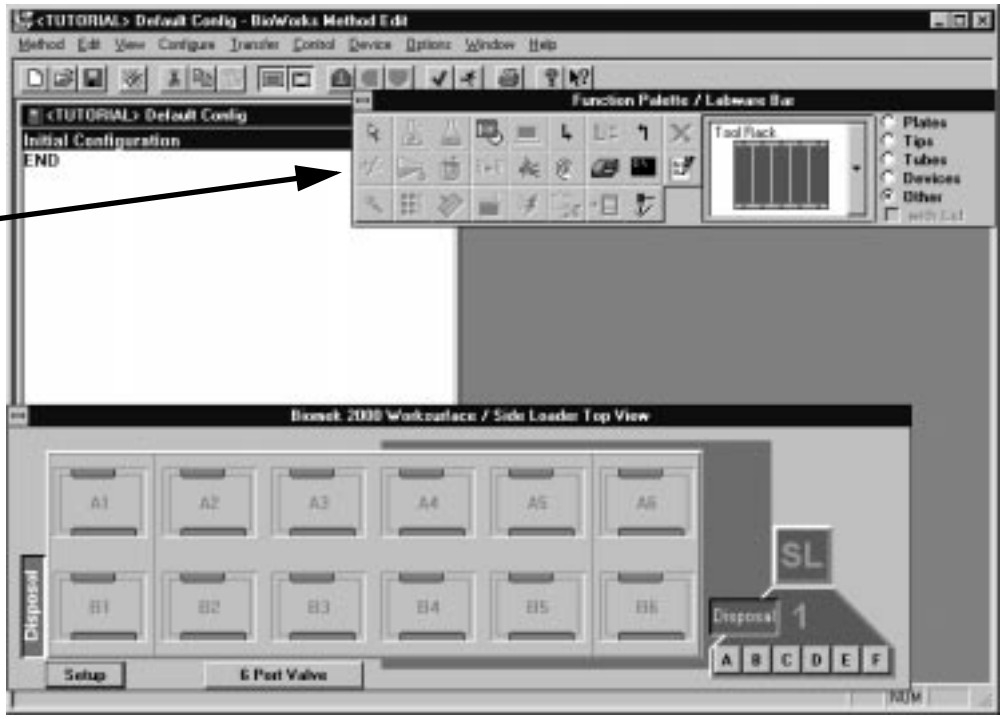


Select the options indicated below and then click **OK**.

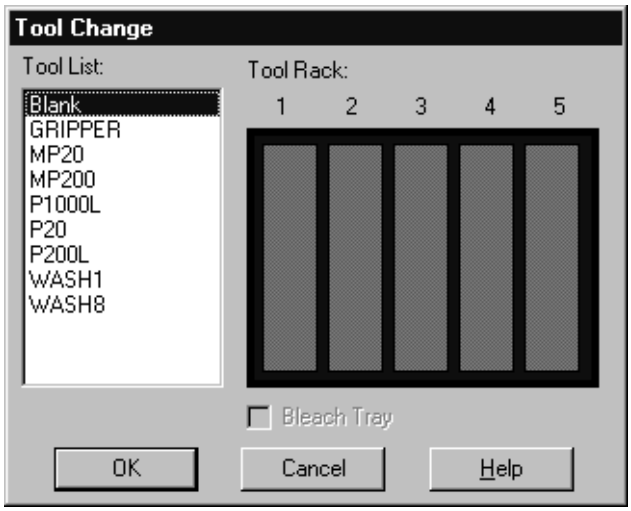


From the Function Palette/Labware Bar, click the **Other** button and then select the **Tool Rack** from the drop-down menu. Move the cursor to Worksurface position **A1** and click.

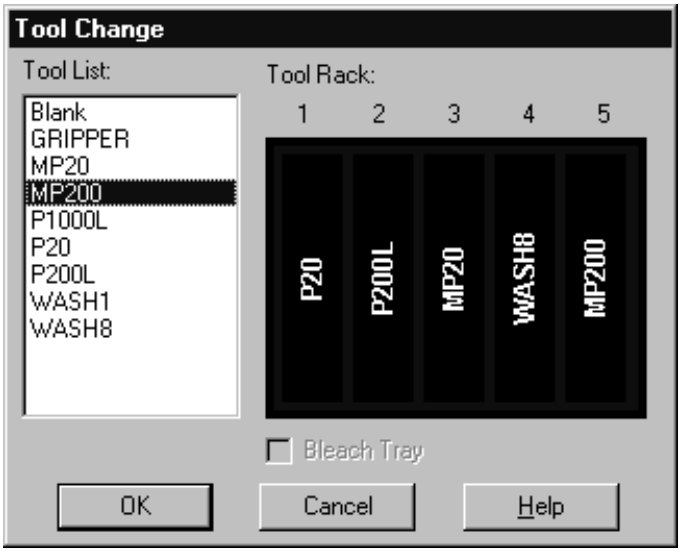
Function Palette Labware Bar



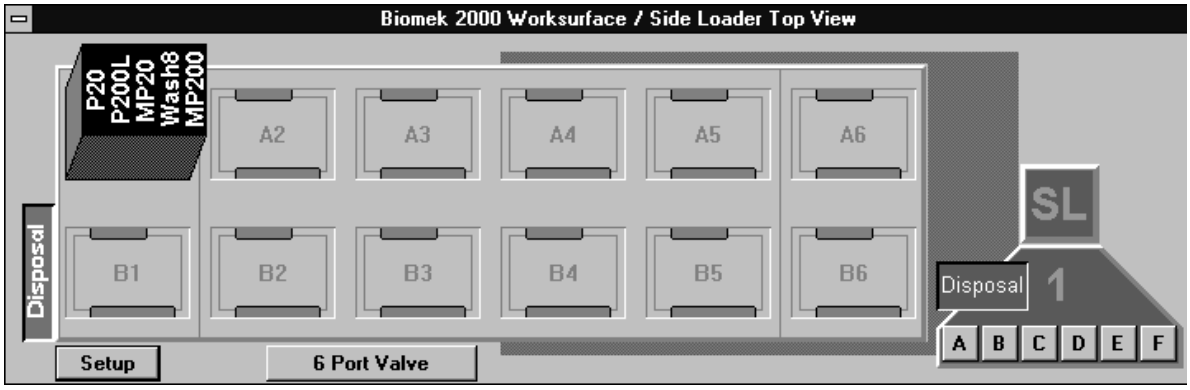
The Tool Change dialog is displayed for configuration of the tools in the Tool Rack:



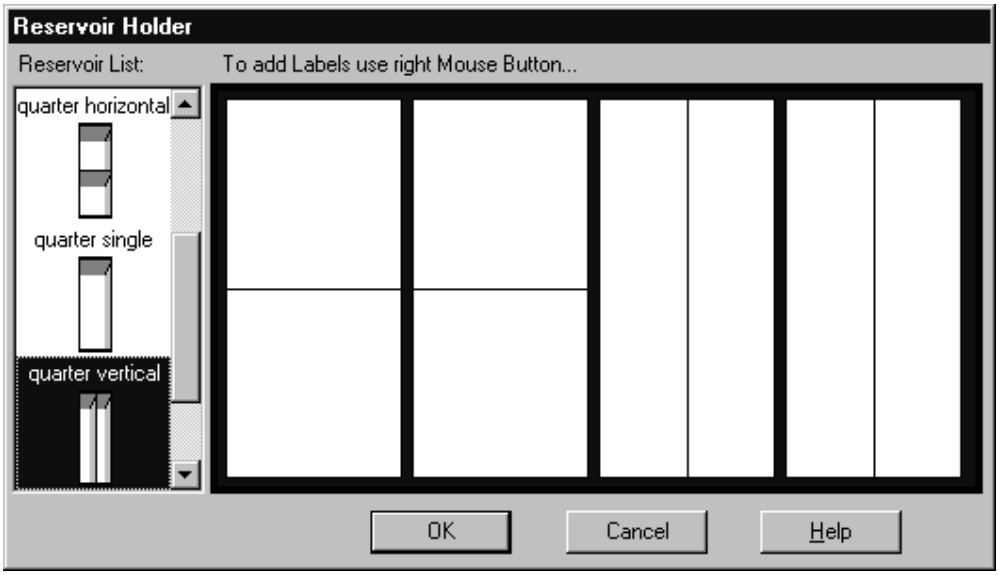
Click the **P20** tool, and then click the left-most tool holder position (position 1) to place the tool. Place the **P200L**, **MP20**, **WASH8**, and **MP200** tools in the same manner. If you click on the wrong tool, simply click on the correct tool, then proceed with placing it in the tool holder. After the appropriate tools have been placed in the holder, click **OK**.



The tool holder with tools will appear in position A1 on the Worksurface:

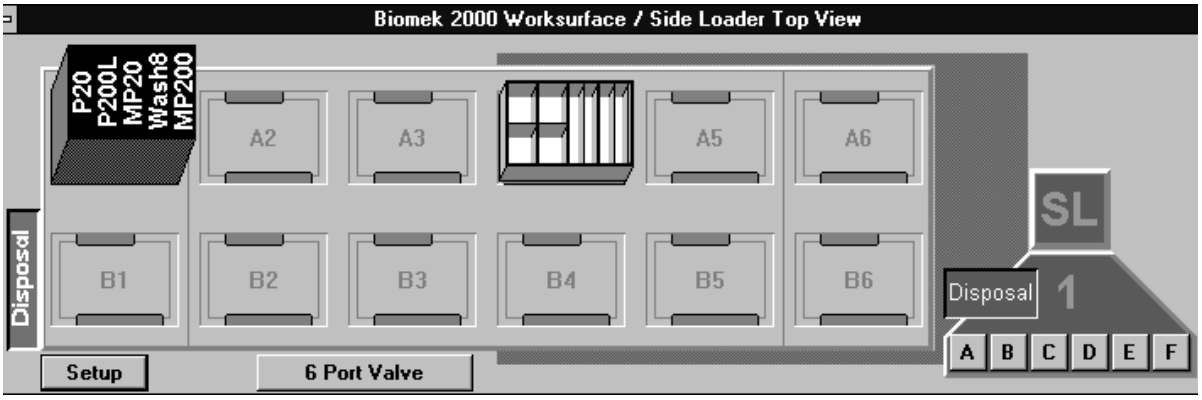


Use the same procedure to place a **Reservoir Holder** (located above the tool rack on the Other drop-down menu) at Worksurface position A4. To configure the Reservoir Holder as shown below, scroll through the reservoir list and place two quarter horizontal reservoirs in the first two positions. Then place two quarter vertical reservoirs in the last two positions of the reservoir holder. Click **OK.**

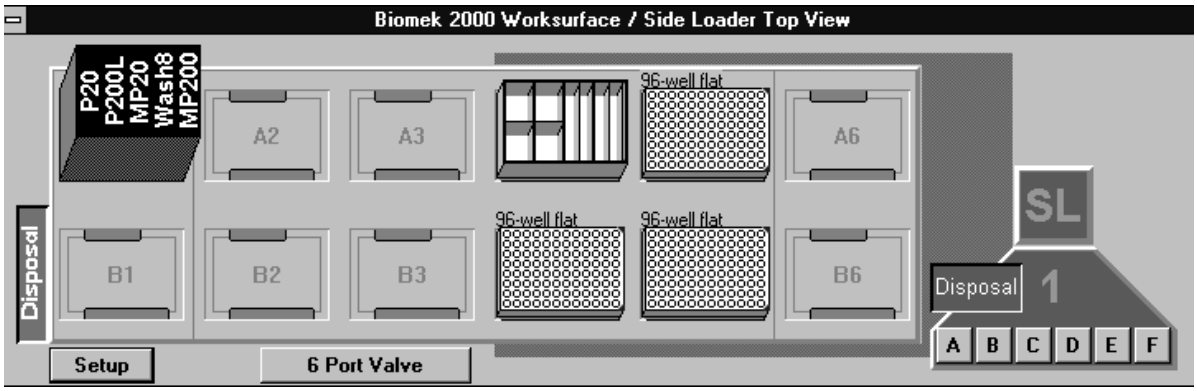


You can add labels to a reservoir by clicking on it with the right mouse button, then entering a label in the dialog.

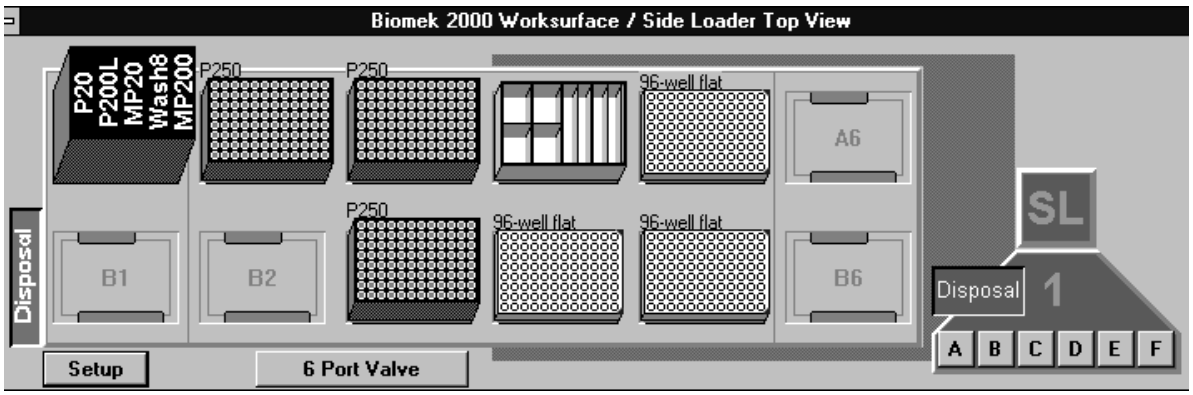
The Reservoir Holder will appear in position A4 on the worksurface:



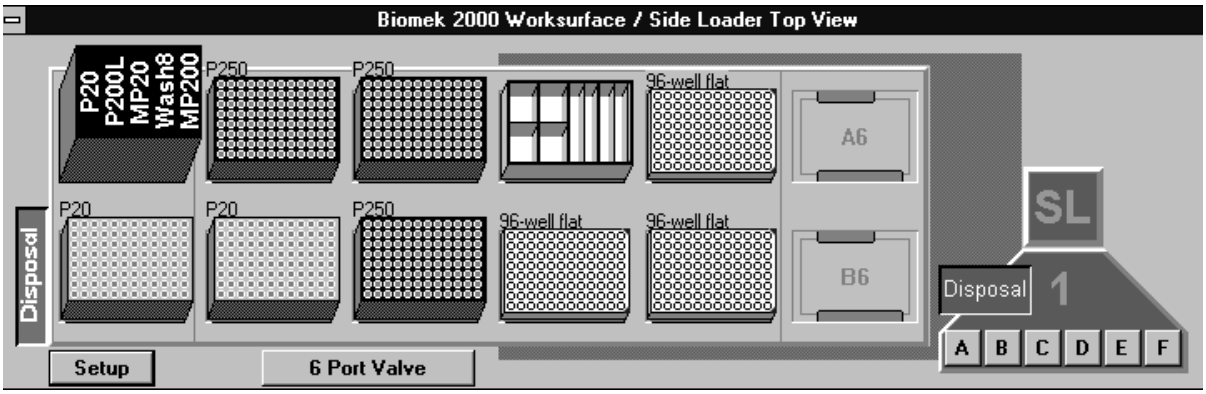
Next, place plates on the worksurface by selecting plates on the Labware Bar, scrolling to **96-well flat**, selecting it, then clicking on locations B4, B5 and A5.



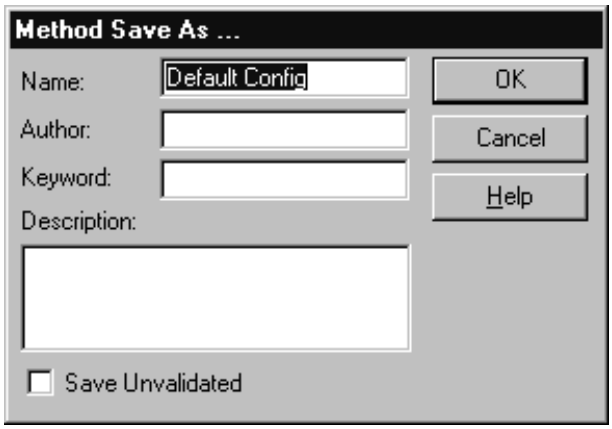
Next, select tips on the Labware Bar, scroll to **P250 tips**, and click on positions A2, A3 and B3.



Place P20 tips at B1 and B2:



To save this configuration as the Default Configuration, go to the **Method** menu and choose **Save As**. Verify that the method name is specified as **Default Config**. The name must be typed exactly as shown for BioWorks to recognize this as a default configuration.



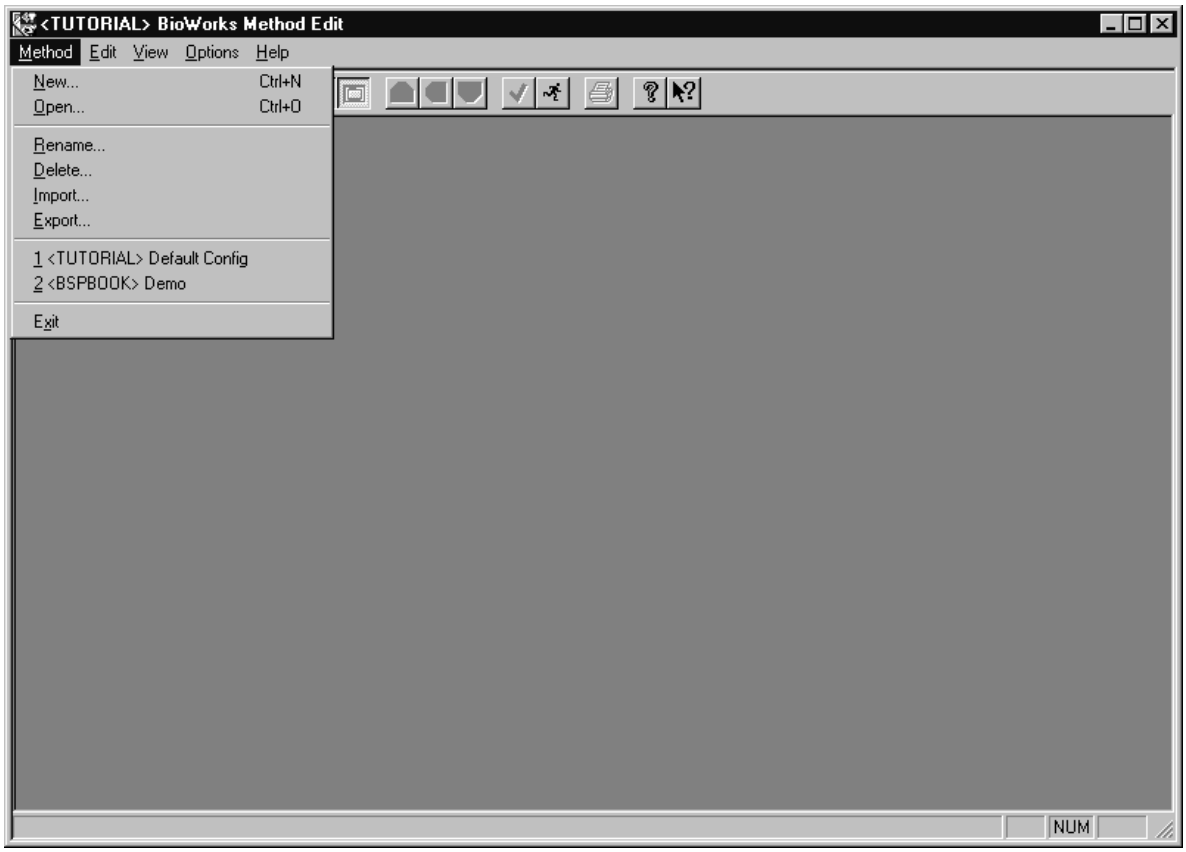
Click **OK**. The default method is automatically validated, and the "Method Validation Complete" screen appears:

Click **OK** to acknowledge the prompt.

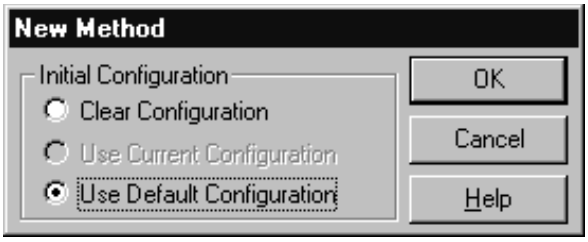
You have successfully edited the default configuration! Close the method by clicking **Method**, then clicking **Close**.

Now, when you open a new method in this lab book, the configuration that you just created will be used for the default configuration.

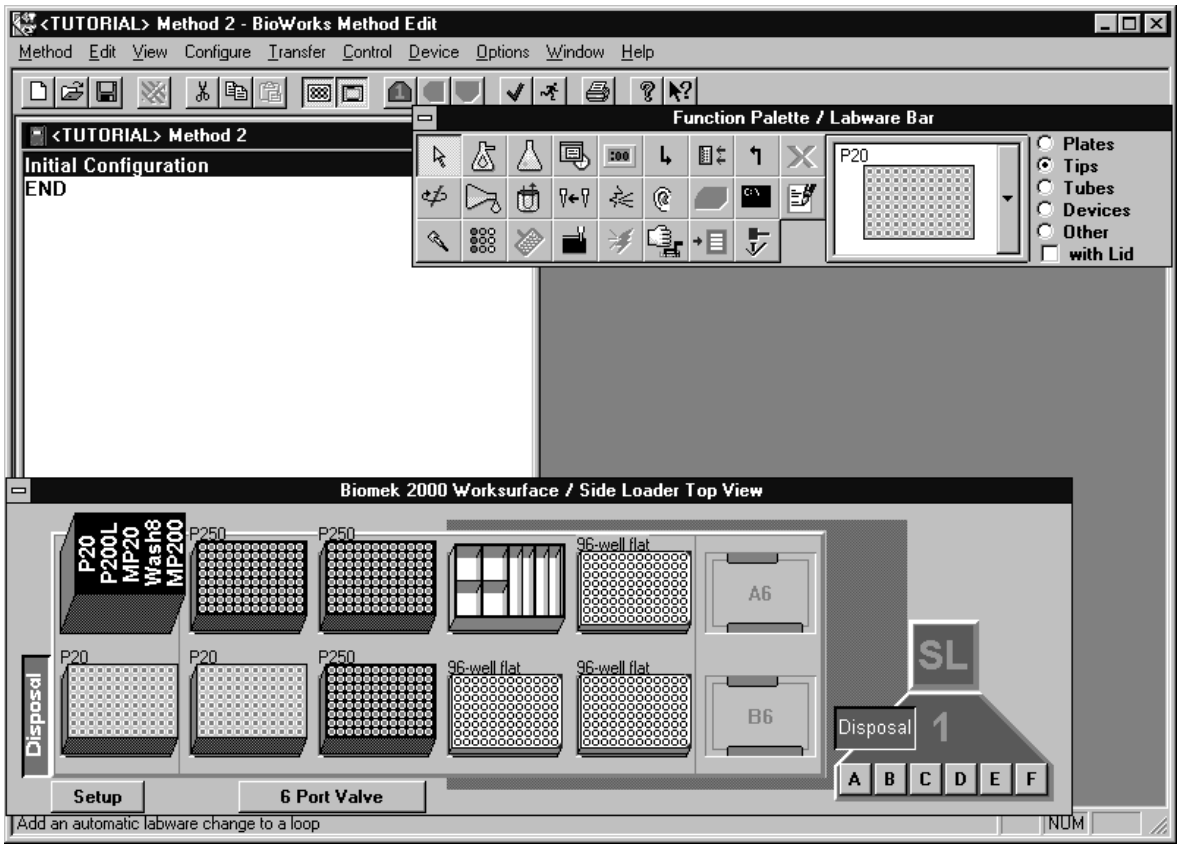
To open a new method, click **Method**, then click **New**.



You will be prompted to select the Initial Configuration for the new method:



When you select **Use Default Configuration**, the labware and tools you just configured are automatically used.



You have now successfully completed exercise 1!

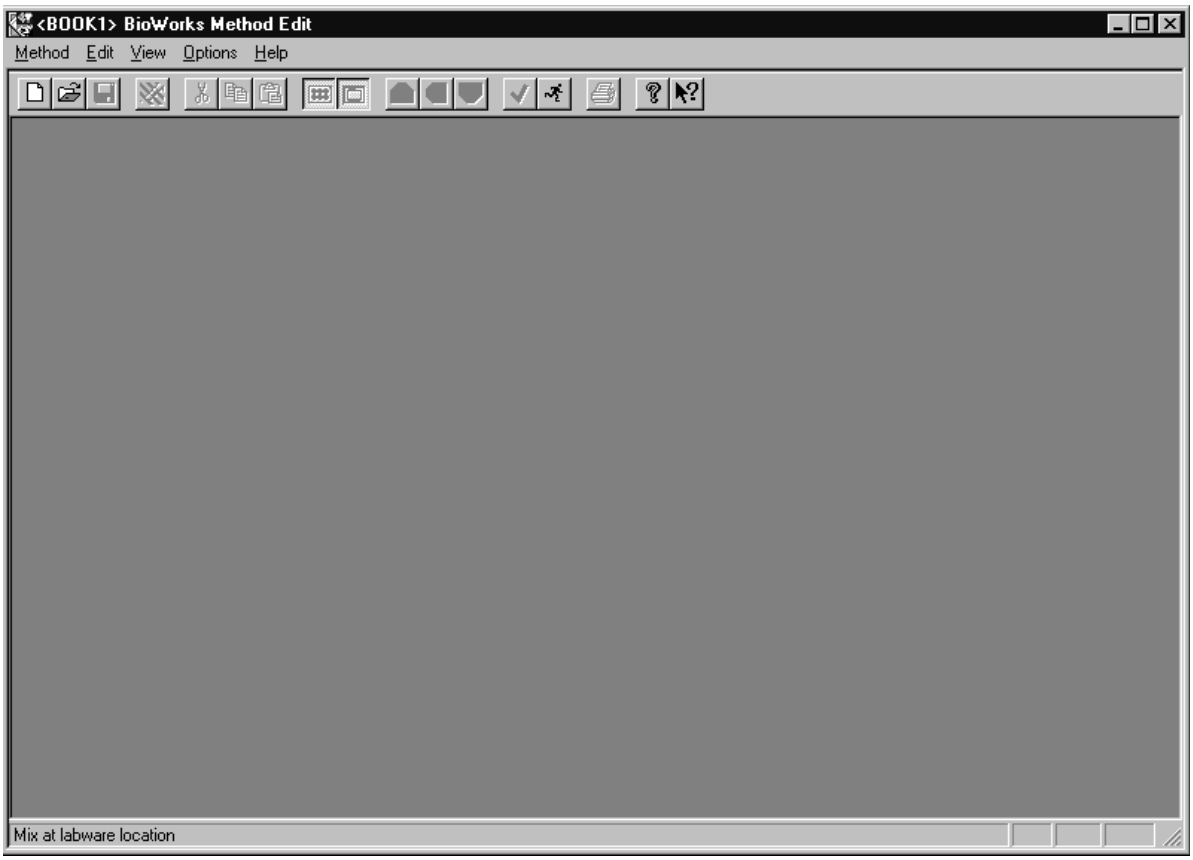
Chapter Three 3

Exercise 2

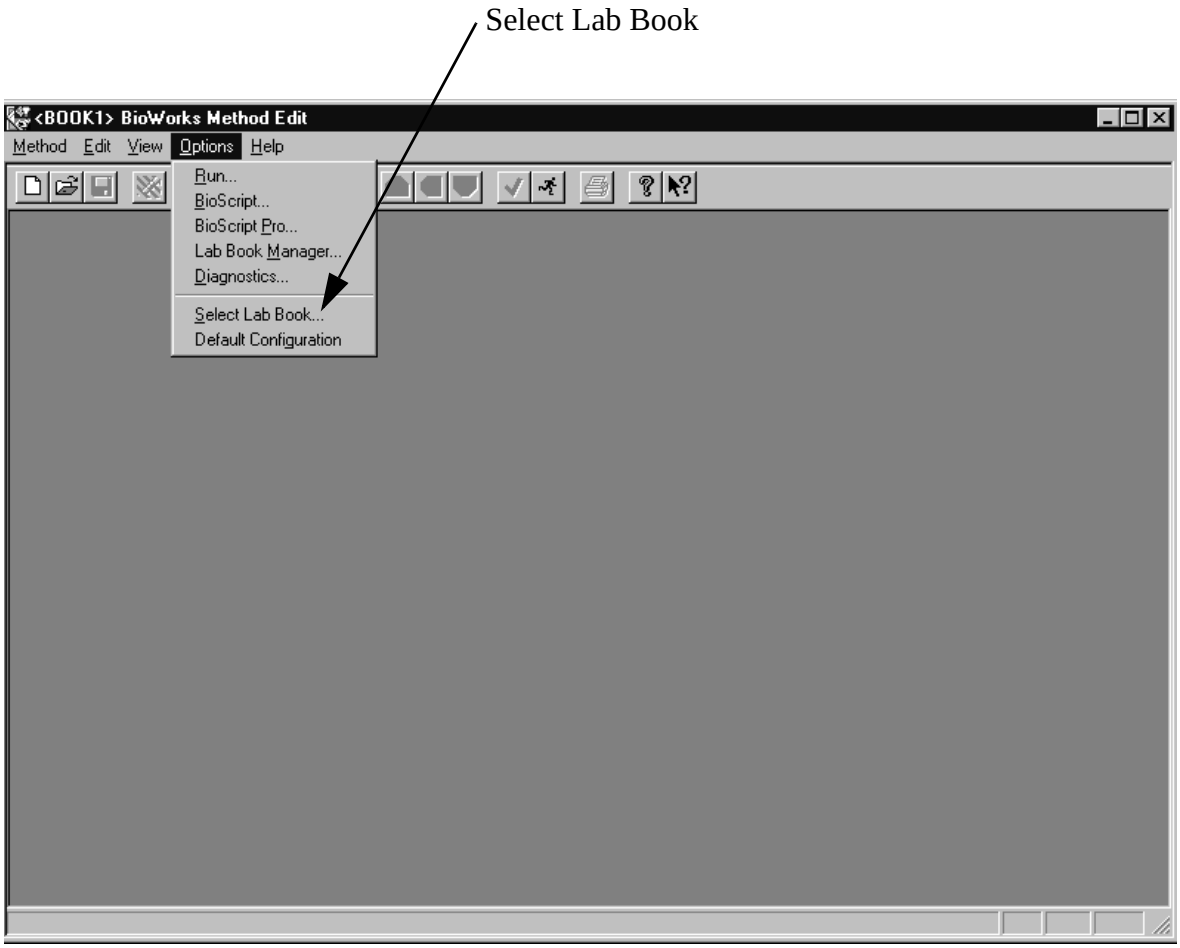
Exercise 2: Editing and Running a Method

This section will guide you through the basics of editing by changing an initial configuration and a transfer function using the Demo method.

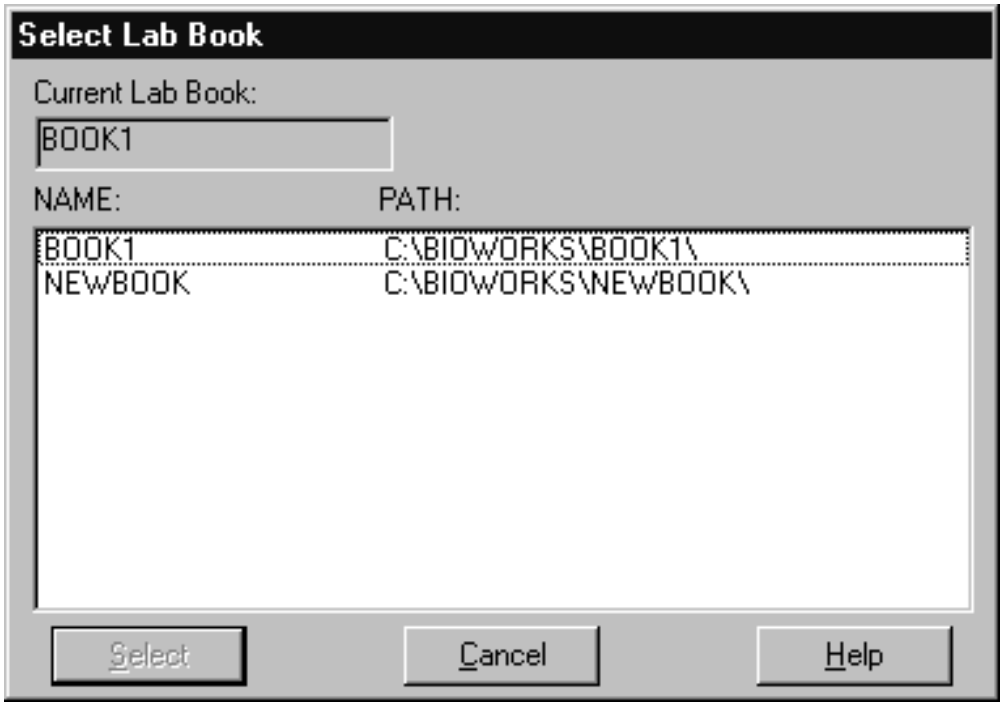
To begin, double click on the **Edit** icon in the BioWorks program group. This displays the Edit window, as shown below.



The name of the current lab book is shown in angle brackets at the top of the window. If the **BOOK1** lab book is currently the default, skip to the next step in the middle of page **3-4**. Otherwise change the lab book to **BOOK1**, by selecting **Options/Select Lab Book...** from the Menu bar.

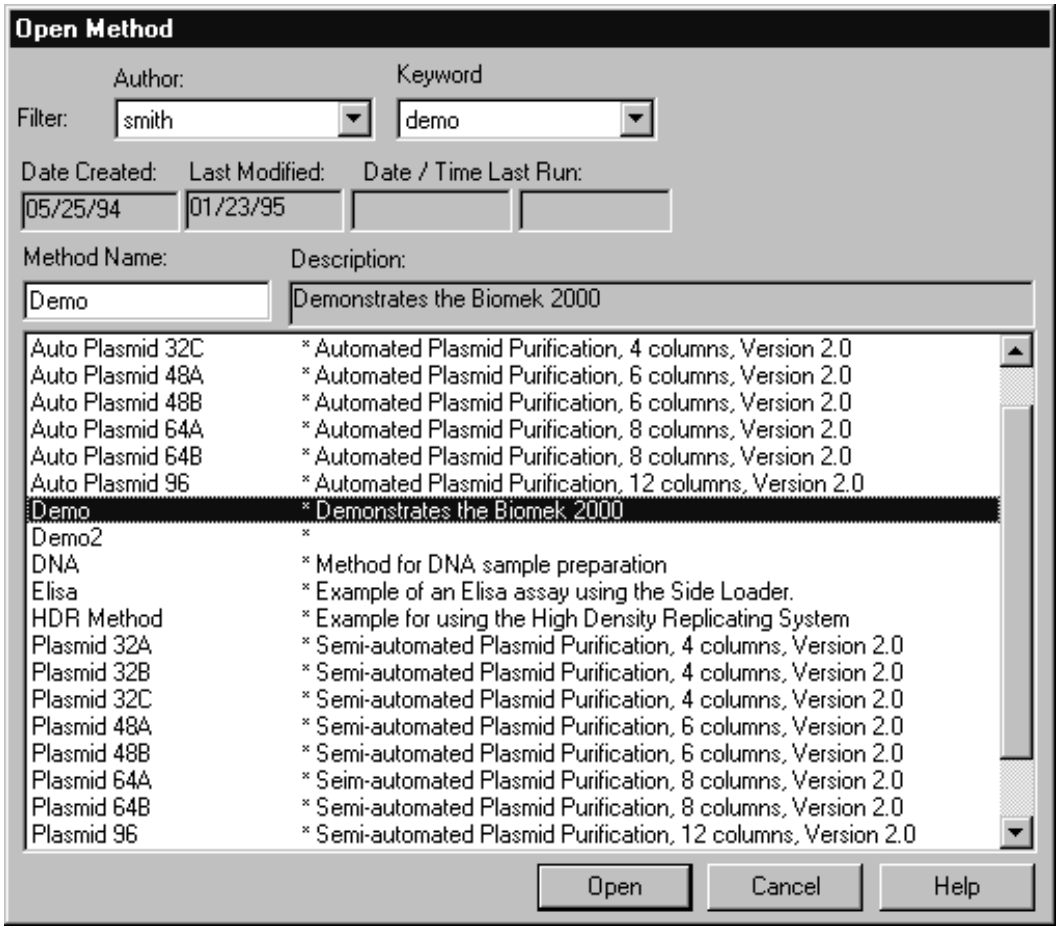

Select Lab Book
<BOOK1> BioWorks Method Edit
Method Edit View Options Help
Run...
BioScript...
BioScript Pro...
Lab Book Manager...
Diagnostics...
Select Lab Book...
Default Configuration

This displays the Select Lab Book dialog:



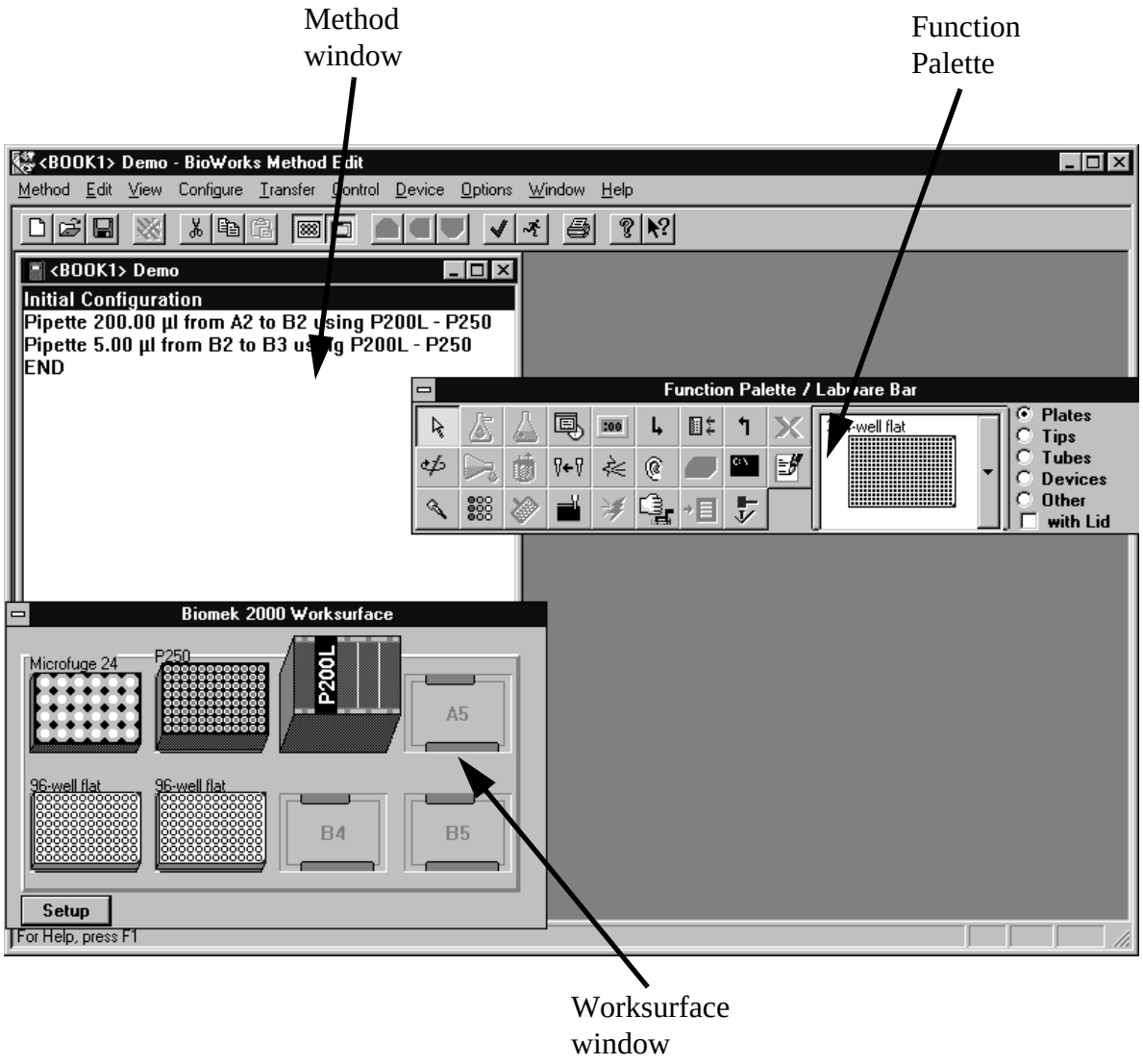
Highlight the **BOOK1** lab book, then click on the **Select** button.

When the Edit window displays <BOOK1> as the current lab book, select **Method/Open** from the Menu Bar of the Edit window. This will display a list of available methods. Select the **Demo** method from the list.



Click **Open** to proceed.

BioWorks loads the method, then displays the Method, Function Palette, and Worksurface windows, as shown below.



Before we begin editing the method, let’s review some important features of the Edit window and its "child" windows:

- Make sure that the “Initial Configuration” line in the Method window is highlighted before you begin placing or moving labware on the worksurface. The labware and locations set when the “Initial Configuration” line is highlighted will be used as the starting point. BioWorks prompts you to verify that labware is arranged properly when you start a method.

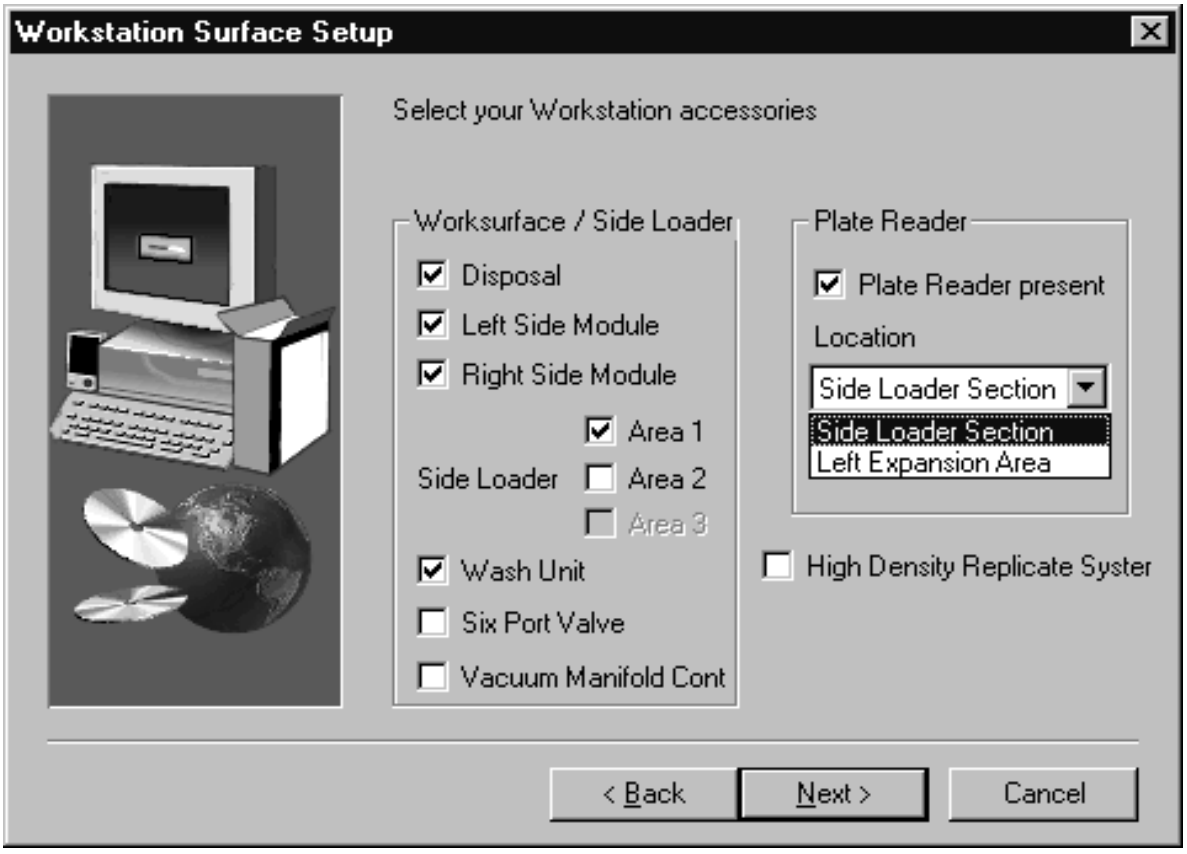
- To place labware on a worksurface location, first you select the item from the Function Palette/Labware Bar window. Use the round buttons to select the type of labware, then scroll to select a specific item. Then place the labware on the desired location on the Worksurface window.
- To delete an item of labware from the Worksurface, click on the item, then press the **Delete** key. (You will be prompted for confirmation.)
- When adding or placing labware on the worksurface, you may receive a "Possible Collision" error message. If this occurs, this does not necessarily mean that you cannot use that position for that labware. However, you should carefully consider whether or not the adjacent labware will cause a conflict based on the information in the warning message. If in doubt, consider using another arrangement.
- If you add, delete, or remove labware when any other line of the method is highlighted, BioWorks will consider this a labware move, and will function accordingly.
- If you add, delete, or move labware during a method, you will notice that the labware displayed on the Worksurface window changes as you increment through the steps in the Method window. This will allow you to verify labware positions as the method progresses.

Changing the Initial Configuration

To change the Initial Configuration for this method, first make sure that the Initial Configuration line of the Method is highlighted.

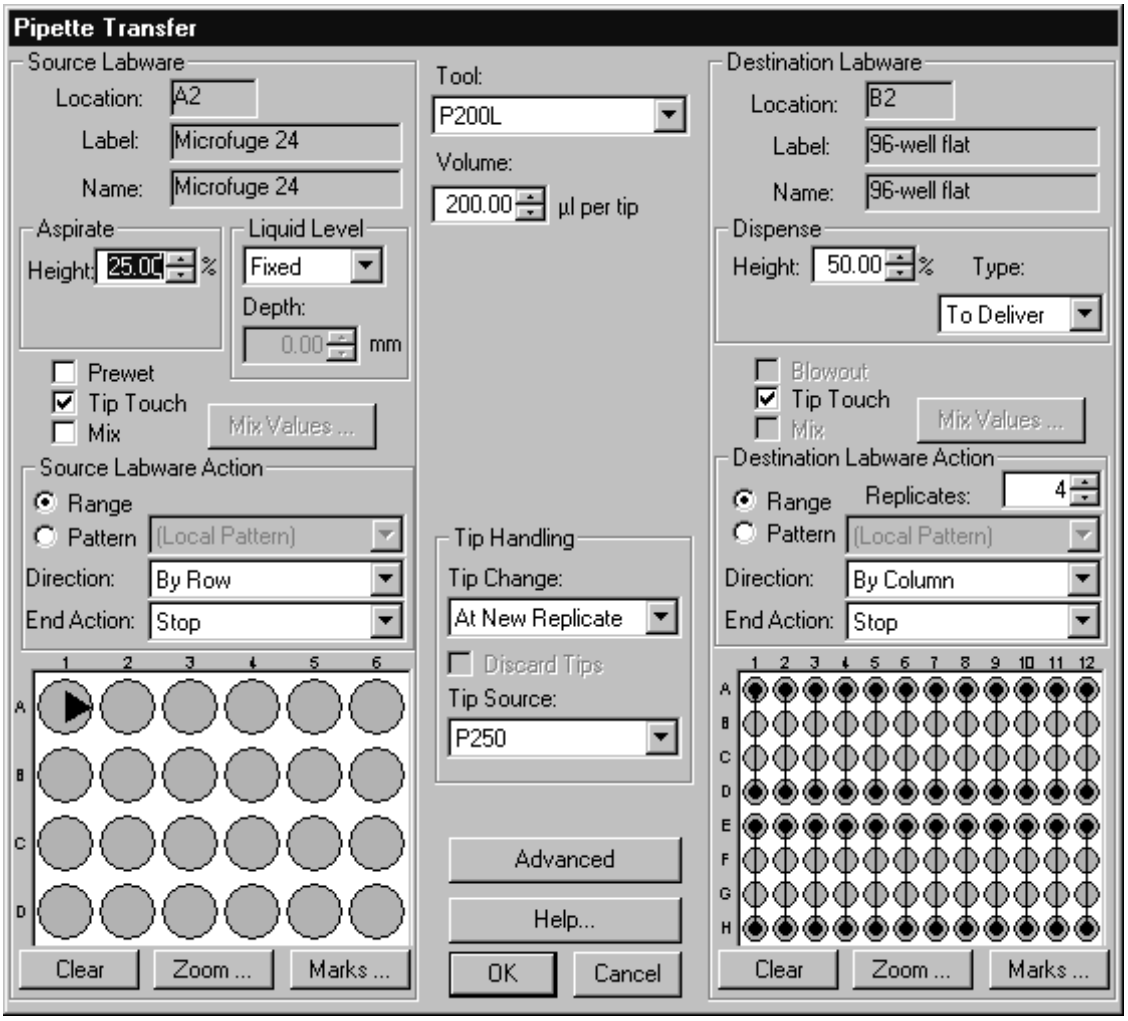
Then, click on the **Plates** button of the Labware bar, then scroll through the list and select the **96-well flat** bottom plate.

The cursor becomes a rectangle (to represent the plate). Place the rectangle on position **B4** to add a third plate to the initial configuration. The new configuration, with the 96-well plate located in position B4 of the worksurface, is shown on the following screen.



Viewing and Editing a Transfer Function

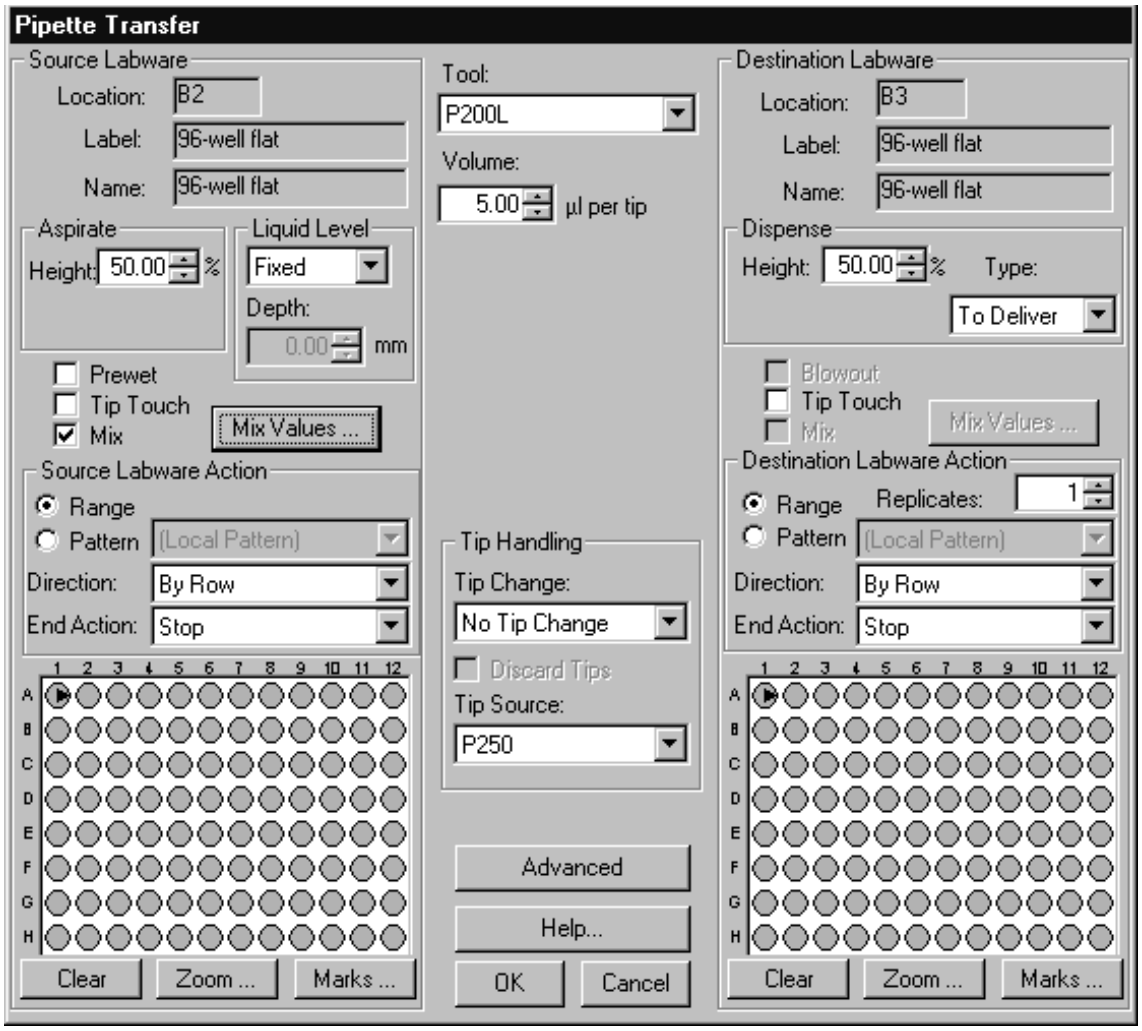
Familiarize yourself with a basic Pipette Transfer function by viewing the first transfer function in the Demo Method. To do this, double-click on the second line in the Method window. This displays the Pipette Transfer dialog for this step.



In this function, the Biomek pipettes 200µL from location A2 to B2 on the worksurface, using the P200L tool. When you have finished viewing the configuration, click **Cancel** to exit the dialog without making any changes.

Next, we will modify the configuration of the second transfer function.

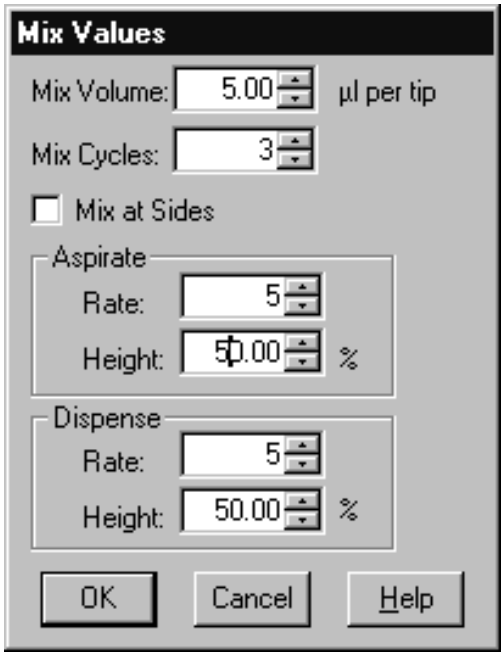
Double-click on the second function (the third line) of the method to display the Pipette Transfer dialog.



To add a Mix function to this step, click on the **Mix** option box for the source.

Then click on the **Mix Values** button to display the Mix Values dialog. Edit the Mix Values dialog as follows:

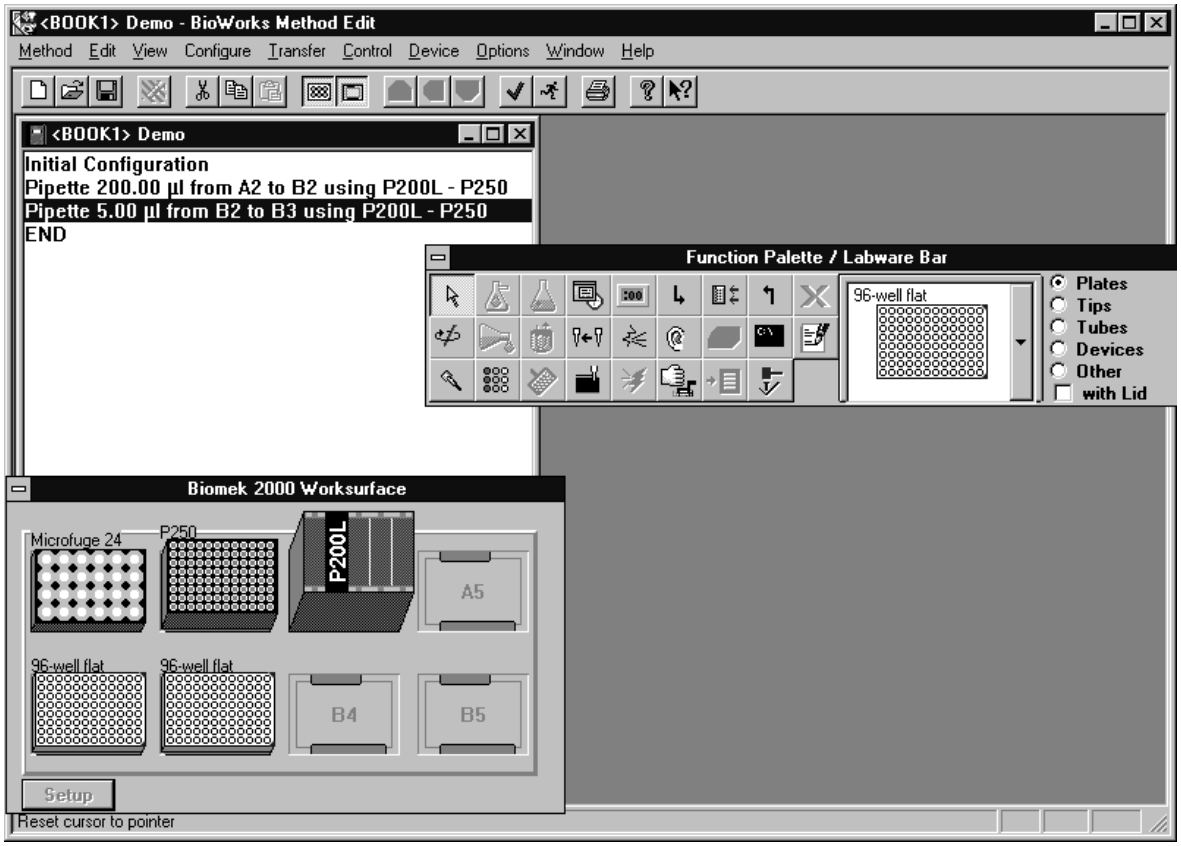
- Change the **Mix Cycles** to **3**
- Change the **Aspirate** and **Dispense Rates** to **5**
- Change the **Aspirate** and **Dispense Heights** to **50**%



When you are done, click on **OK** to exit this dialog, then click on **OK** again from the Pipette Transfer window. Note that the Edit Window will not reflect changes made to a transfer function when they involve parameters not included in the descriptor line.

Adding a Transfer Function

Now you will add a new transfer function to the method. Highlight the last transfer function in the Method window, then click on the **Pipette** button on the Function Palette.



The cursor's shape changes to a pipette symbol.

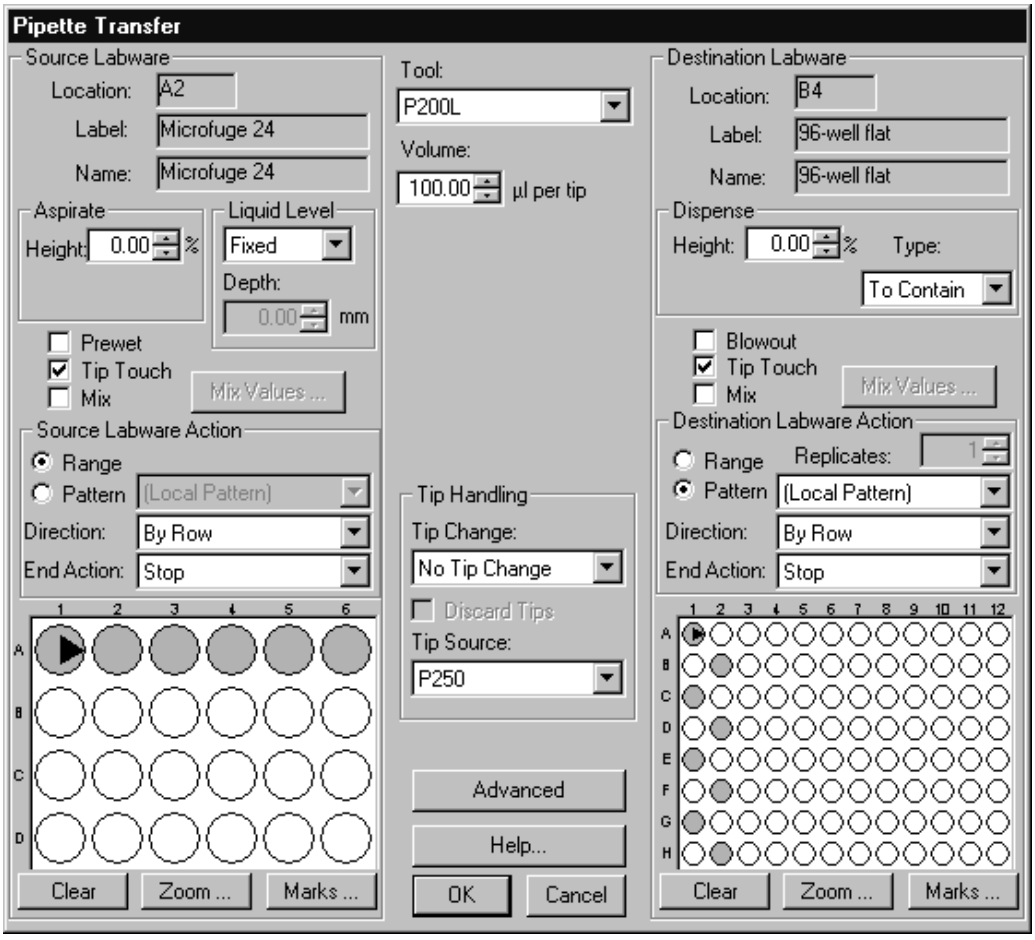
Click on location **A2** to designate the source, then click on location **B4** for the destination. The Pipette Transfer dialog is displayed.

Set the options on the dialog as follows:

- Make sure the Tool is set to **P200L**
- Set the volume to **100µl** per tip
- Set the Source Labware Action to **Range** and the Direction to **By Row**. Use the cursor to highlight the top row of wells on the source plate
- Set the Destination Labware Action to **Pattern** and Direction to **By Row**. Use the cursor to highlight at least 6 wells of the destination plate in any pattern you choose.

  Note that if you select more than 6 wells, only the first six will be used because there are only 6 source wells selected. If you want to fill more than 6 wells on the destination plate, you could either select more source wells (to fill each with a different source) or change the Source End Action to "Repeat Same Labware" (which would reuse the source wells until all of the destination wells were filled).
- Select a **Tip Touch** at the source and at the destination
- Select **Fixed** for Liquid Level

The dialog should look like the one shown on the following screen (patterns for the destination plate may be different).

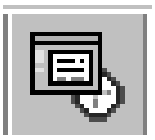


Click **OK** to add this step to the method.

Inserting Messages and Pauses

You can also insert messages to the operator and system pauses in a method. Using the same method, now add a pause before the second pipette transfer to display a message to the operator. We will display a message to inform the operator that the system will pause for one minute after the message is acknowledged.

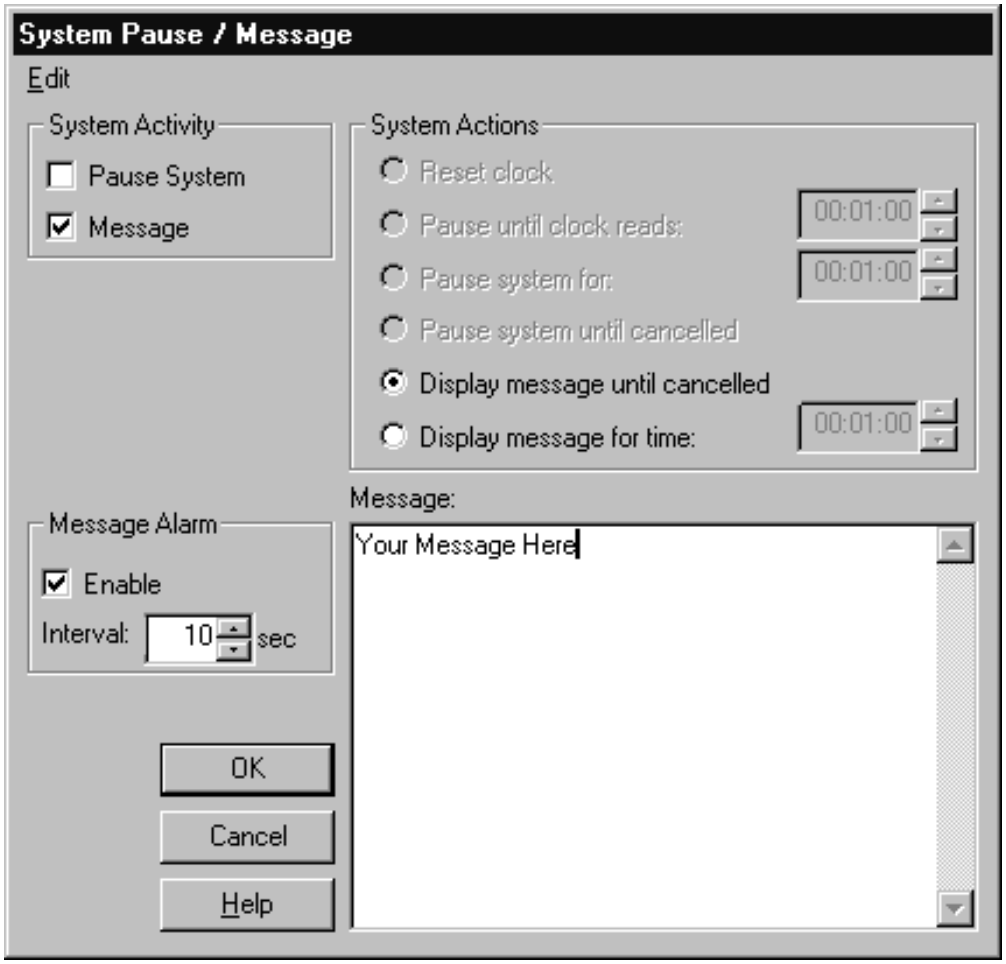
From the Edit Window, highlight the second pipette transfer (in the Method Window) then click on the **Pause System** button on the function pallette.



This displays the System Pause/Message dialog. Select the dialog items as follows:

- Set System Activity to **Message**
- Set System Actions to **Display message until canceled**
- Type a message in the Message box
- Enable the **Message Alarm** and set the **Interval**, if you wish

The dialog should look like the one shown:



Click **OK** to add the *Message* step to the method. (Note that we have not yet added the *pause* itself.)

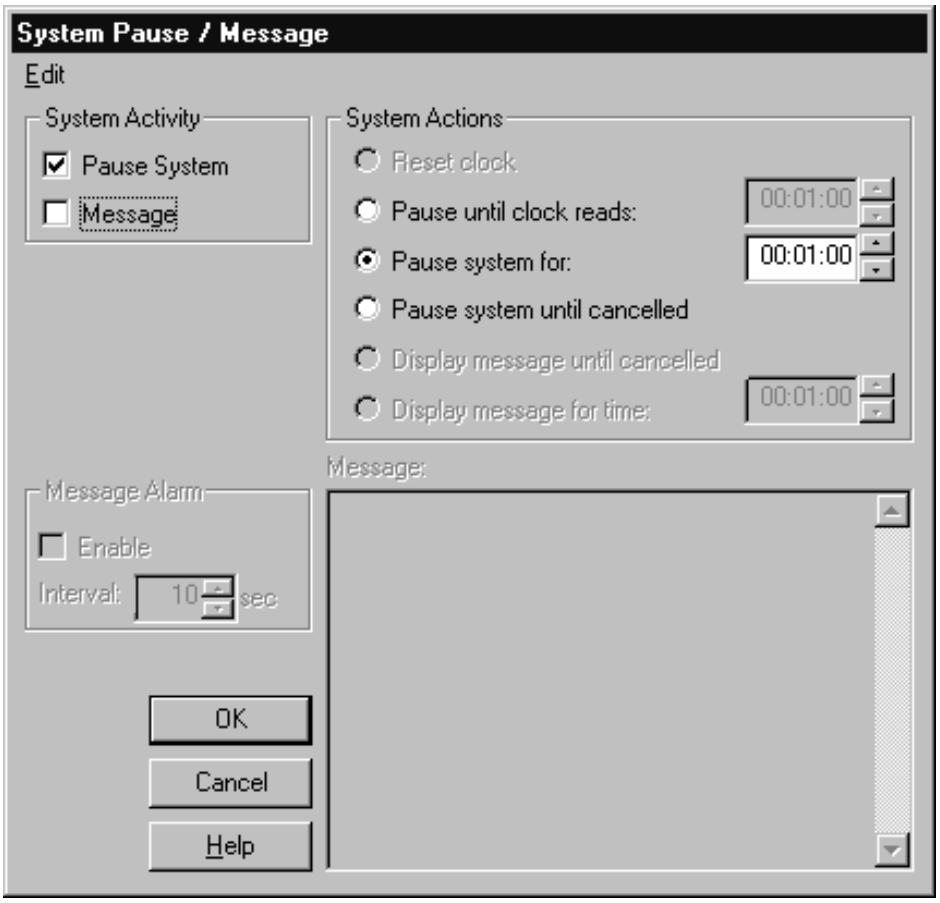
Now, insert the system pause between the message and the next pipette transfer. Highlight the second pipette transfer line in the method (note that new method steps are always inserted before the highlighted line in a method).

Click on the **Pause System** button again.

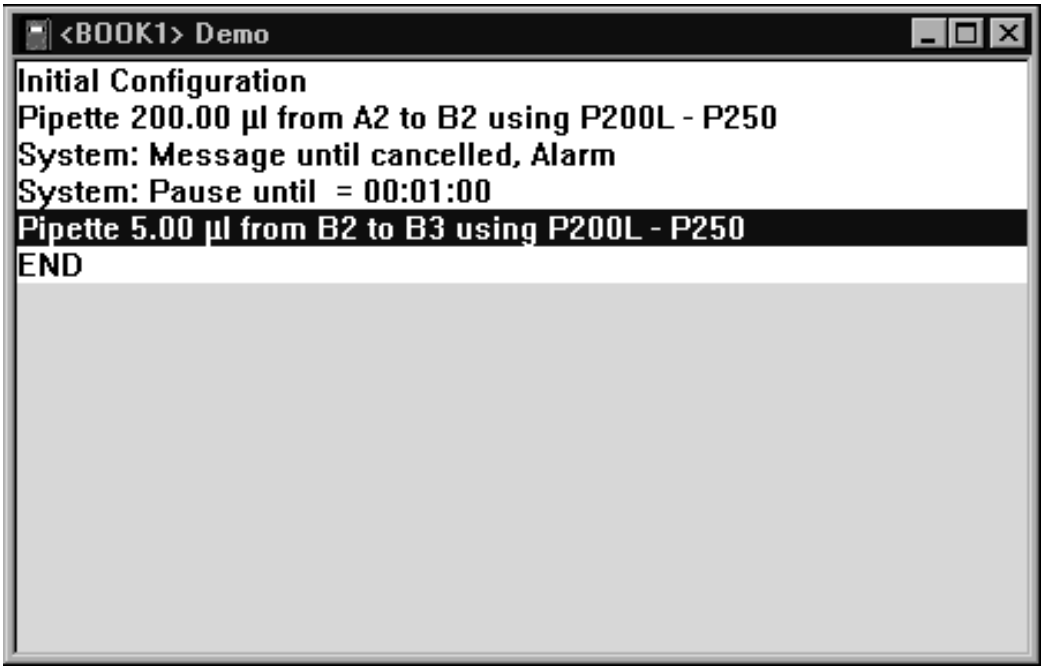
This displays the System Pause/Message dialog. Specify a pause by selecting the dialog items as follows:

- Set System Activity to **Pause System**
- Set System Actions to **Pause system for,** then set the timer to **1:00** minute

The dialog should look like the one shown below:

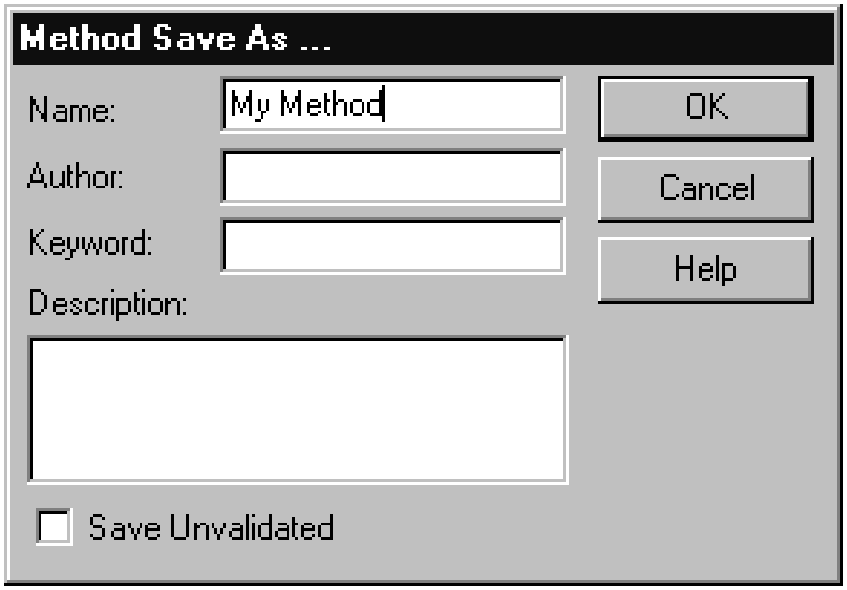


Click **OK** when you are finished.



Saving a Method

Before proceeding, you should save your edited method under a different file name. To do so, select **Method/Save As...** then enter a file name of your choice in the dialog.

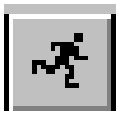


Note that when you save a method, it is automatically validated, unless you request otherwise. A method must be validated before it can be run.

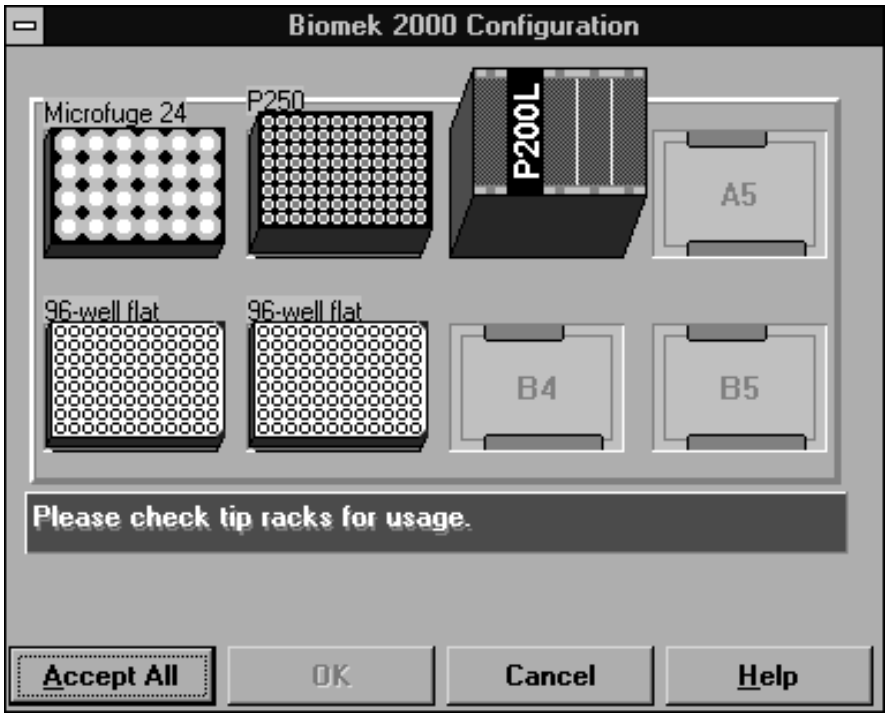
Running a Method

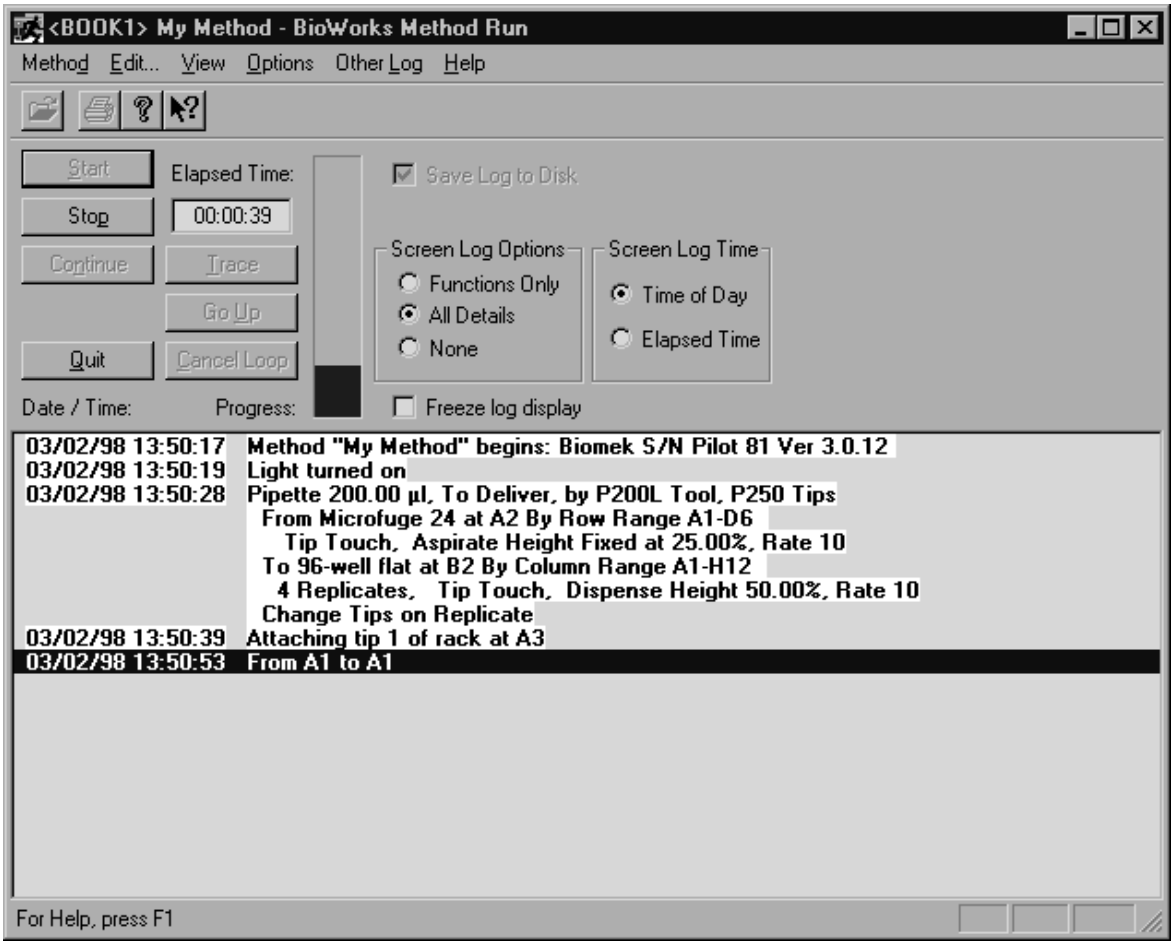
Before you run a method for the first time on a new Biomek, you must perform an alignment check and re-align the Biomek (and Side Loader) if necessary. Refer to the *Biomek 2000 Hardware and Software Installation Guide* for alignment instructions. If the Biomek has already been aligned and been in use, you can run your new method now.

To run the method, click on the Run icon in the icon bar of the BioWorks Edit window:



The Biomek 2000 Configuration screen will appear. This screen will serve to remind you to set up labware, tip racks, and tools on the worksurface.You will be prompted to accept the worksurface configuration. When you have set up your worksurface appropriately, click on the **Accept All** button to accept the worksurface configuration.





The method will begin, and the **Method Run** screen will be displayed (as shown above), showing a list of actions performed during the method run.

Once the run is completed, you will have successfully completed exercise 2!

Chapter Four 4

Exercise 3

Exercise 3: Pipette Transfer

In this exercise, you will perform a liquid transfer from a source to a destination, using the Pipette Transfer icon button and window. The objectives of this exercise are to:

- Use the Function Palette and identify the Pipette icon button.
- Identify a source and destination for a liquid transfer.
- Identify the components of the Pipette Transfer window.
- Access the “advanced” pipetting options.
- Use “Repeat Pipetting.”

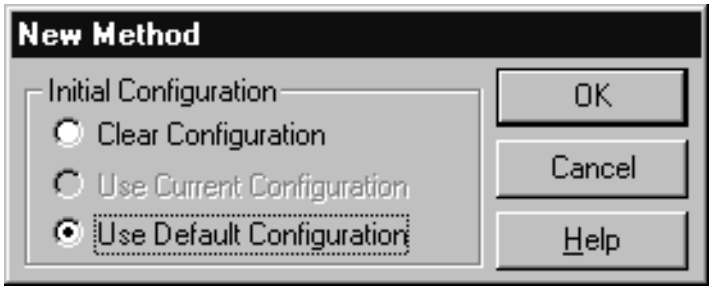
Task

Pipette 50 µL from the first (top left) quarter horizontal reservoir into the first 12 wells (row) of the 96-Well Flat plate in position A5. Perform a tip touch at source and destination.

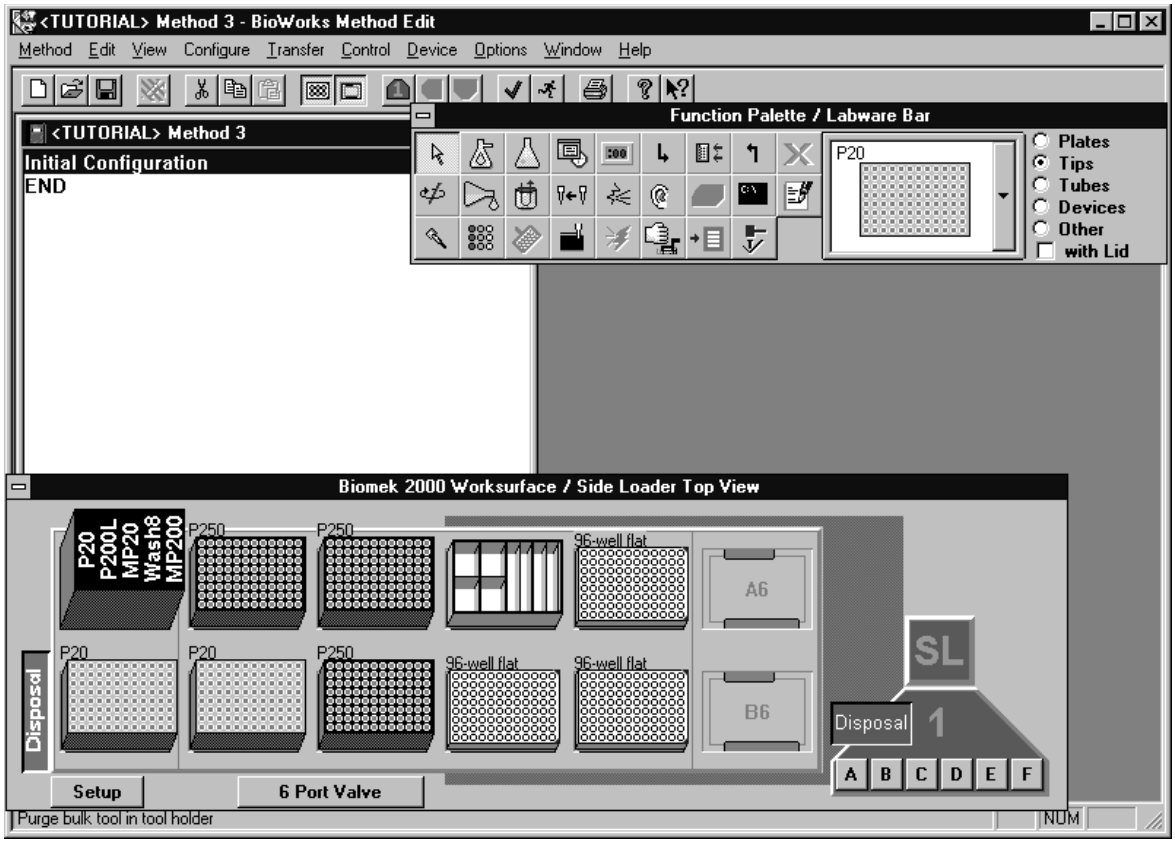
Pipette Transfer

If you do not have the method open from Exercise 2, then you should open a new one as follows:

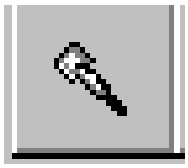
- From the BioWorks “Method Edit” window click **Method** and then **New.**
- Click **Use Default Configuration**, and then **OK**.



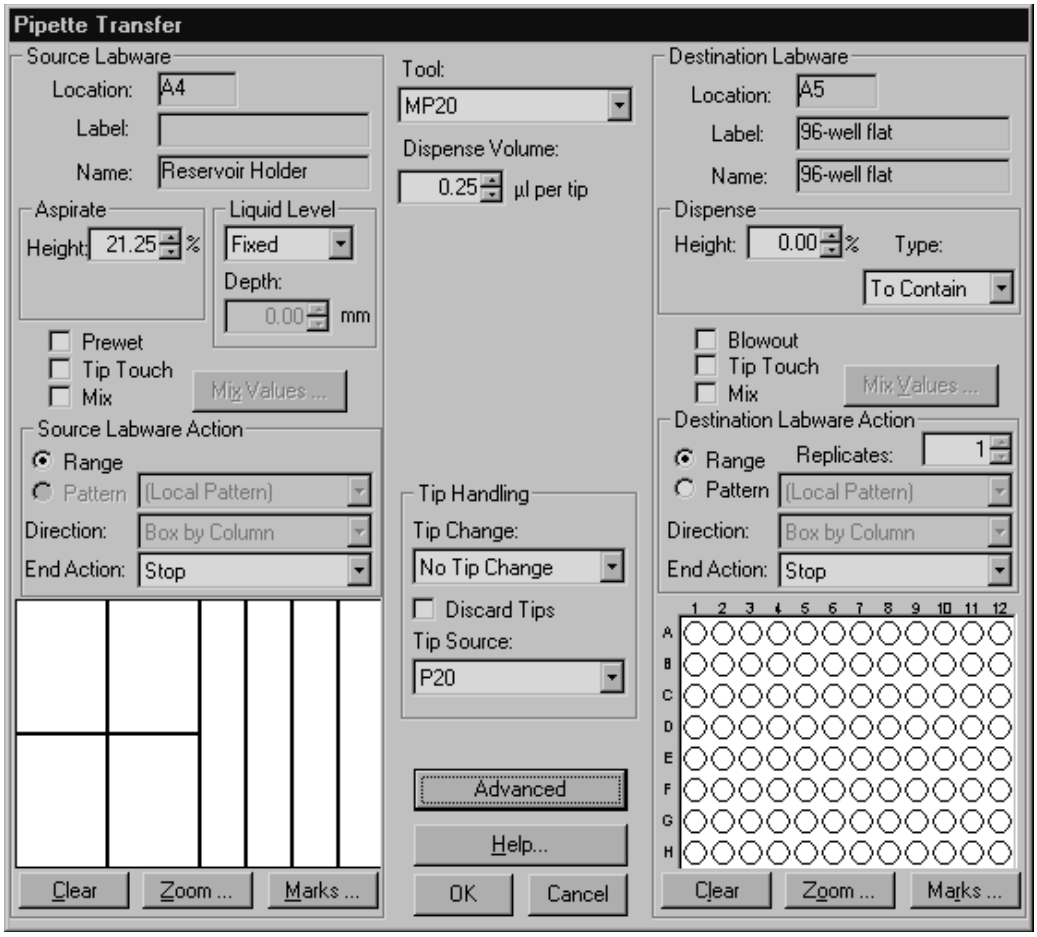
You should see the Default Configuration you prepared in Exercise 1:



Click on the **Pipette** icon button on the function palette:



The mouse cursor turns into a pipette tip. Move the pipette tip to the reservoir source at A4. The pipette tip will “fill” with liquid. Move the pipette tip to the destination (the 96-Well Flat plate in position A5) and click. The following “Pipette Transfer” window will appear:



The “Pipette Transfer” window is divided into three vertical sections. The middle section identifies the tool, pipette tips, and volume. The far left section identifies the pipetting source and parameters. The far right identifies the pipetting destination and parameters. Take a moment to review this window and consider the task identified at the beginning of this exercise:

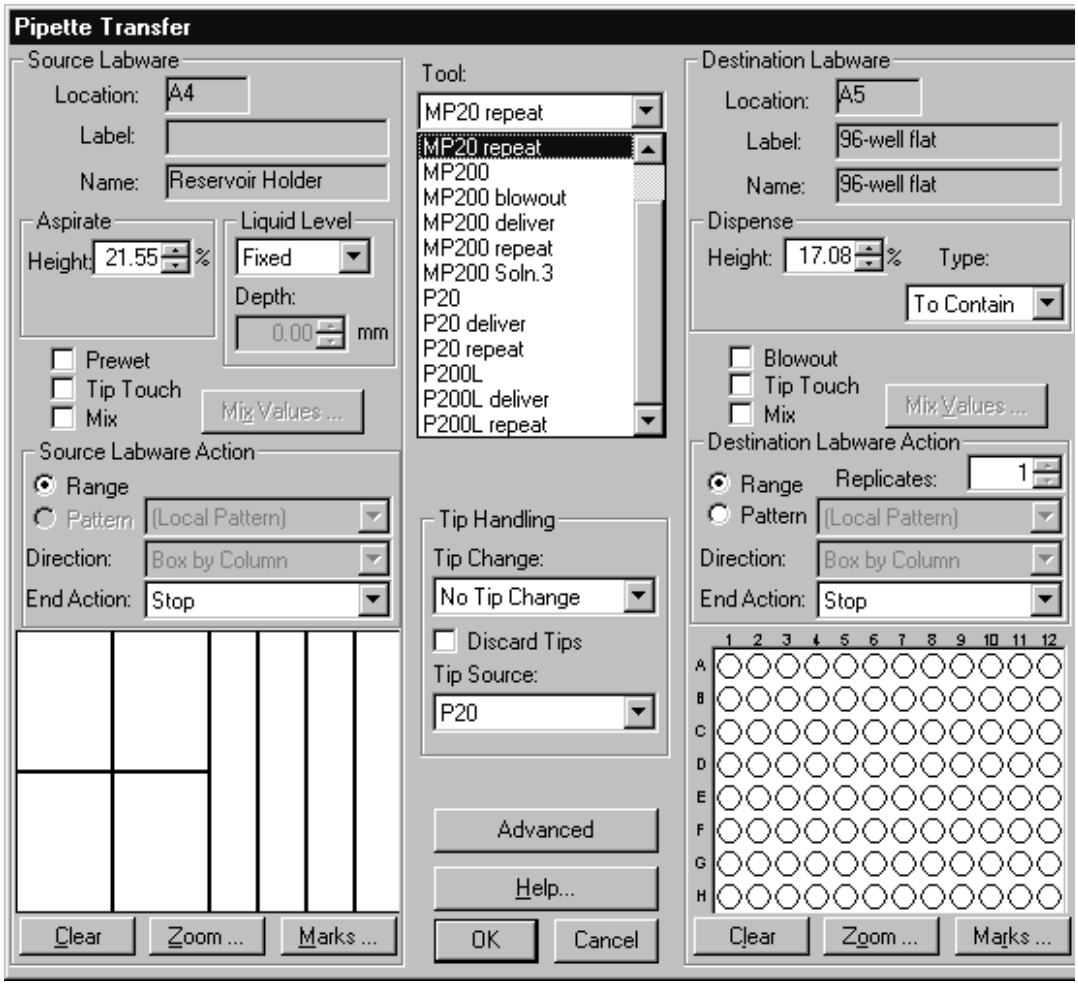
- Pipette 50 µL from the first (top left) quarter horizontal reservoir into the first 12 wells (row) of the 96-Well Flat plate in position A5. Perform a tip touch at source and destination labware.

There is more than one way to write a method for pipetting 50 µL from one reservoir location to 12 wells of a 96-Well Flat plate. In order to perform this task in relatively few steps while maintaining an accurate transfer, “Repeat Pipetting” will be utilized. Using a P200L tool, four dispenses of 50 µL each can be made from one liquid aspiration. Therefore, it will take only three aspirations to fill 12 wells of the 96-Well Flat plate.

Configure the “Pipette Transfer” window as follows:

Center Section

To choose a P200L tool to pipette in a single row, click the **arrow** on the Tool menu and then click on the **P200L tool**.



Click the **volume bar** (either position the cursor or highlight the area) and type in a volume of 50 µL .

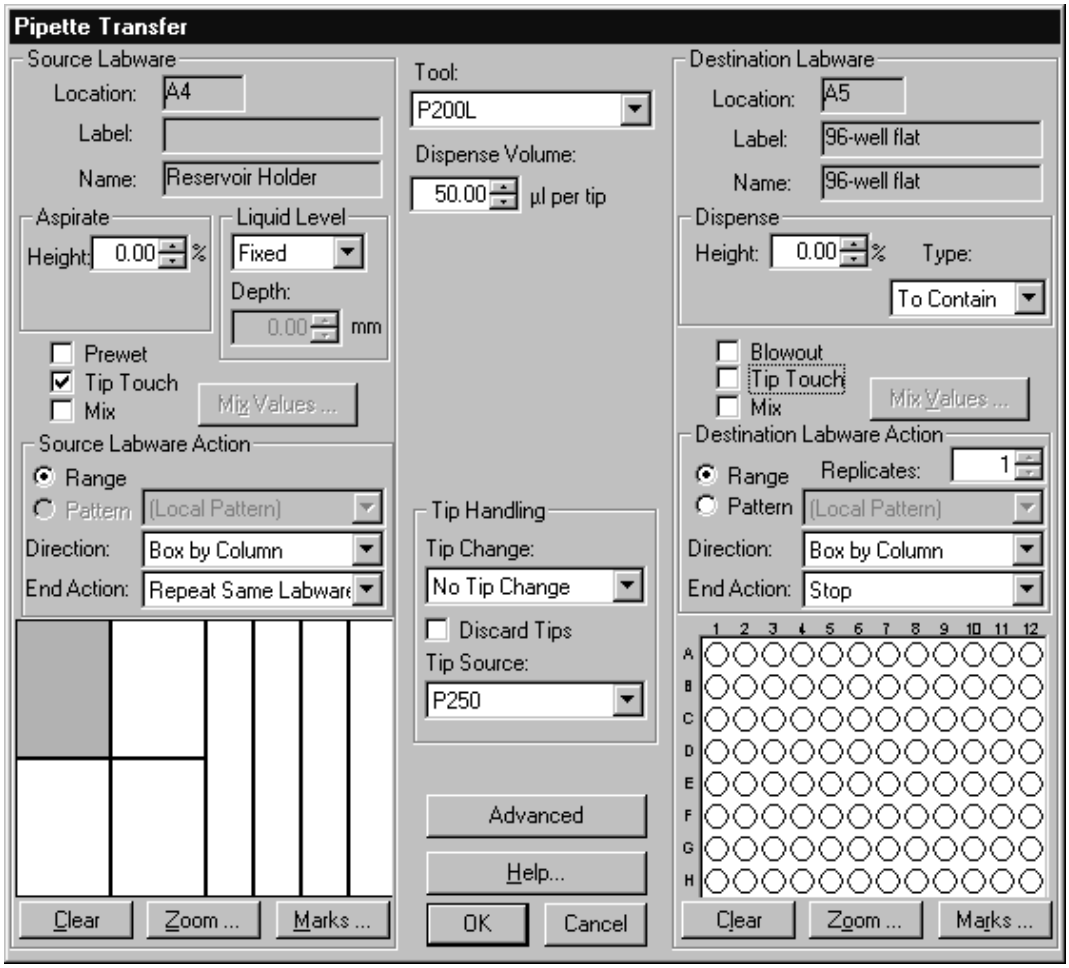
Left Section

In the Source Labware section, set the **Aspirate Height** to **0.00%,** so that the pipette tip will go to the bottom of the reservoir.

Click **Tip Touch**.

Since liquid will be aspirated from only one horizontal quarter reservoir, click on that (**horizontal quarter reservoir**) position.

Click the **End Action** arrow and select **Repeat Same Labware**. Repeat Same Labware tells the system to repeat the range at the source or destination, until the other range is filled.



Right Section

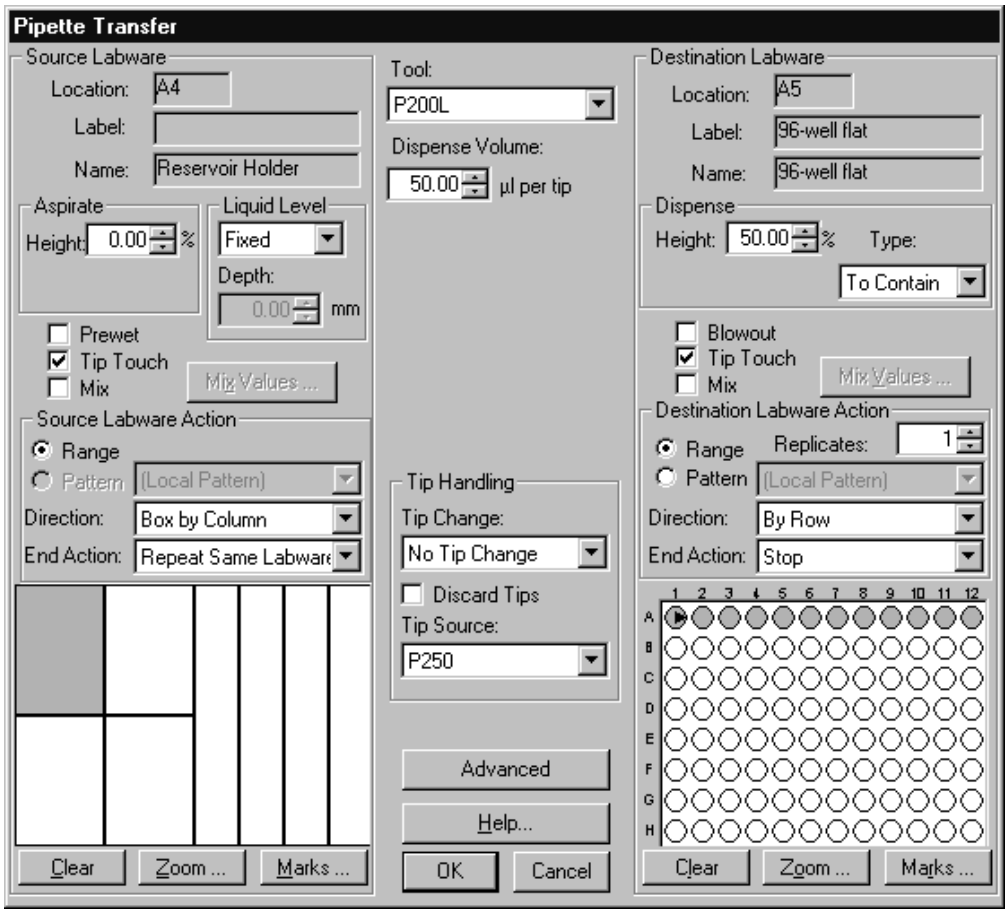
In the **Destination Labware** section, set the **Dispense Height** to **50.00%** so that liquid will be dispensed at 50% of the well's height.

Click **Tip Touch**.

Range will automatically be selected for the **Destination Labware Action**.

Since the dispense will be to 12 wells in one row, click the **Direction** arrow and click **By Row**.

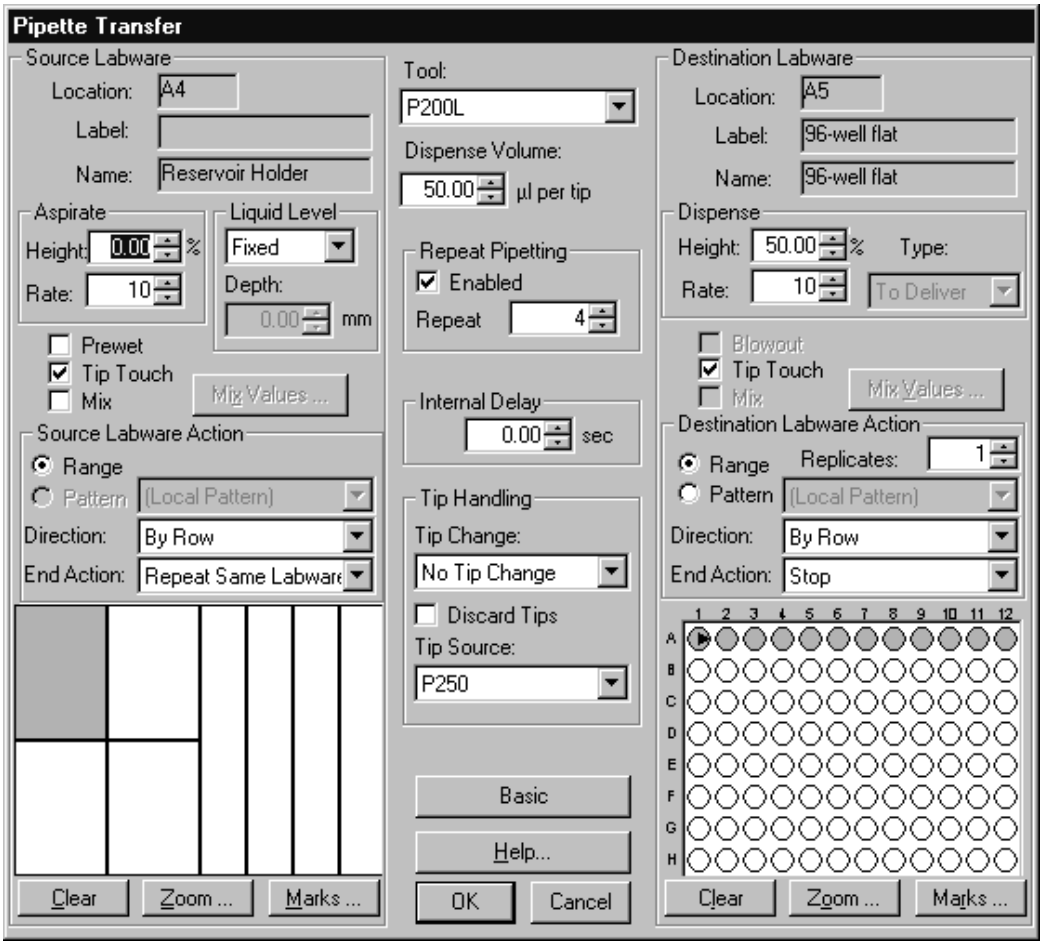
Click and drag from well **A1** to **A12** on the 96-Well plate diagram. Ensure that the **End Action** is on **Stop** so that only these wells receive liquid.



Center Section - Advanced

Go to the center section of the “Pipette Transfer” window, and click the **Advanced** button located in the lower portion of the window section, to show **Repeat Pipetting** further up. Click **Enabled** for Repeat Pipetting . Click the **Repeat** "up" arrow until “**4**” appears.

The completed window appears, as shown on the next page.

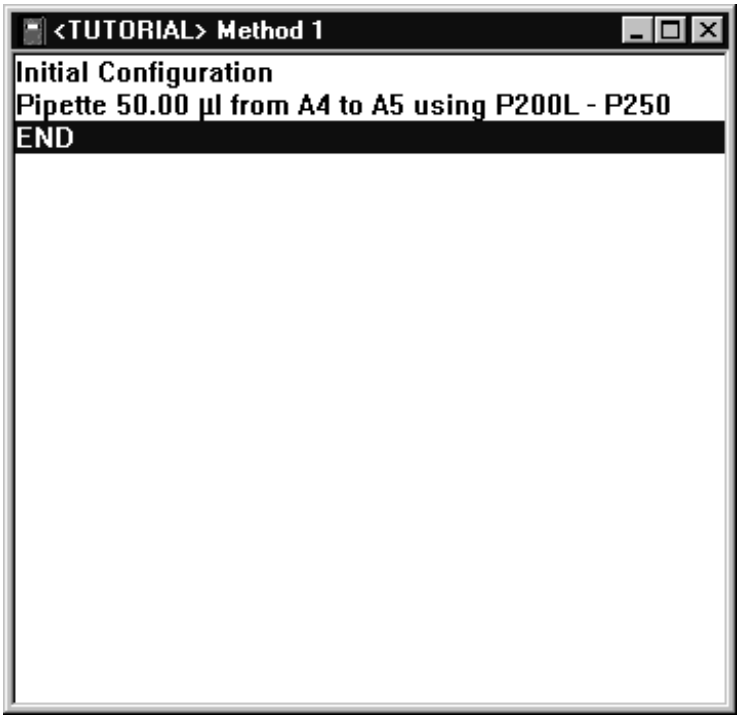


Click **OK** to complete this function.

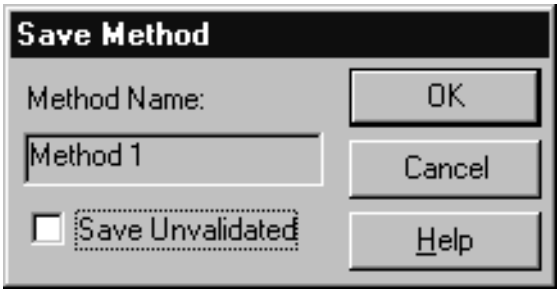
The following transfers will occur:

- 50 µL of liquid is dispensed four times from a single 200 µL aspiration, using a P200L tool and “Repeat Pipetting.”
- One horizontal quarter reservoir is used as “Source Labware.”
- Liquid is aspirated from the bottom of the reservoir with a tip touch after each aspiration
- The same source is revisited after the four dispenses since the source end action is “Repeat Same Labware.”
- 12 wells in a row on a 96-Well Plate are used as “Destination Labware.”
- Liquid is dispensed at 50% of the well’s height with a tip touch after each dispense.
- The pipette transfer function ends after the 12 wells receive liquid since the destination end action is “Stop.”

The “Method List” window will appear as follows:



Click the **Method** menu and then click **Save.**



Type in the name ”Method 1”, then click **OK** to save the method as “Method 1.” The method will be validated and saved, and the following window will appear:

Click **OK**. Close the method by selecting **Method/Close**.

You have successfully completed Exercise 3!

Chapter Five 5

Exercise 4

Exercise 4: Pipette Transfer with Pauses, Loops, and Marks

In this exercise you will modify “Method 1” that you created in Exercise 3. You will use two different modes of pause, beginning and ending loops, and marks. The objectives of this exercise are to:

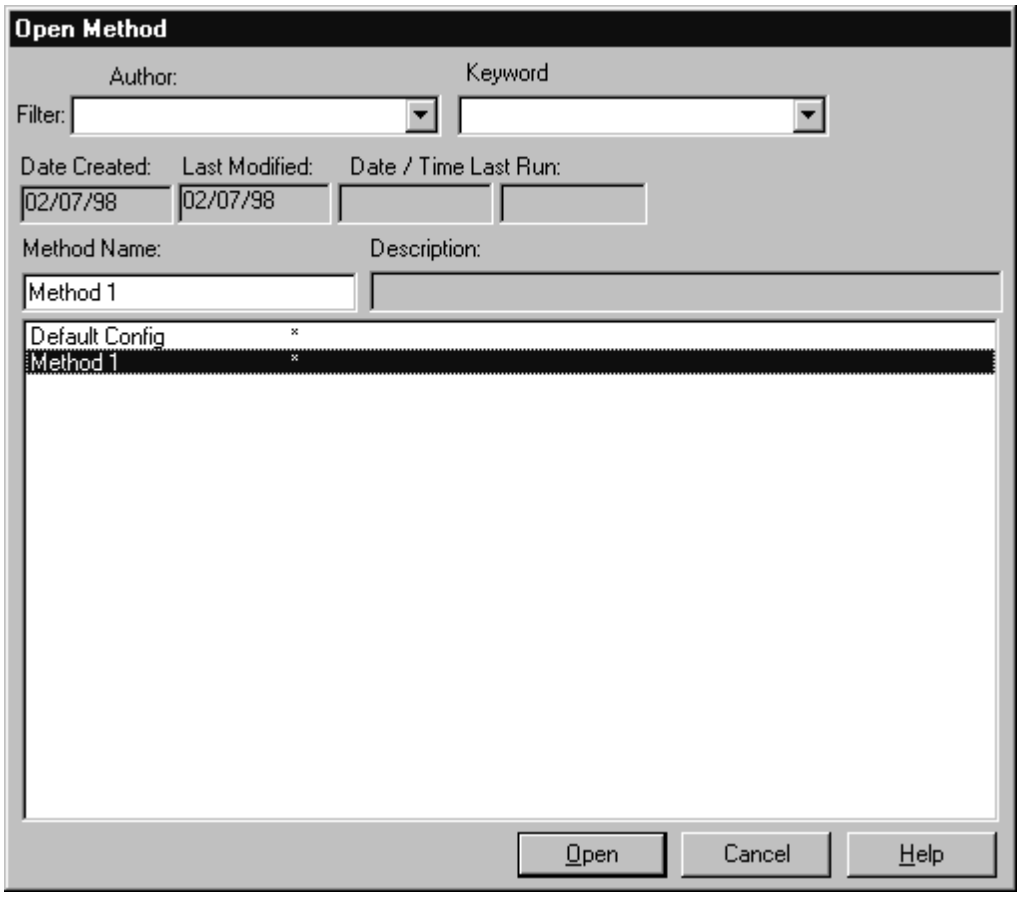
- Identify and open a “saved” method.
- Access a function in a method list.
- Use “Internal Delay” in the advanced section of the “Pipette Transfer” window.
- Use the Pause Labware icon button on the Function palette.
- Use the Begin Loop icon button on the Function palette.
- Use the End Loop icon button on the Function palette.
- Use marks on the “Pipette Transfer” window.

Task

Modify “Method 1” to pause one minute between each dispense, and save the method as “Method 2.” Modify “Method 1” to pause five minutes between each dispense, and save the method as “Method 3.”

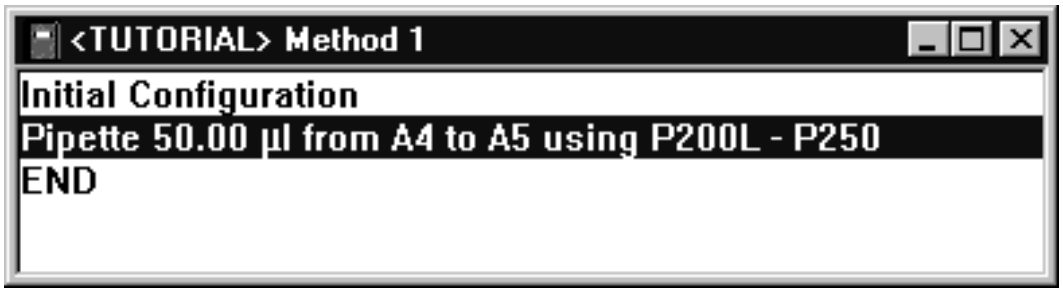
Pipette Transfer with Pauses, Loops, and Marks

Click the **Method** menu and then select **Open**. The following window will appear:

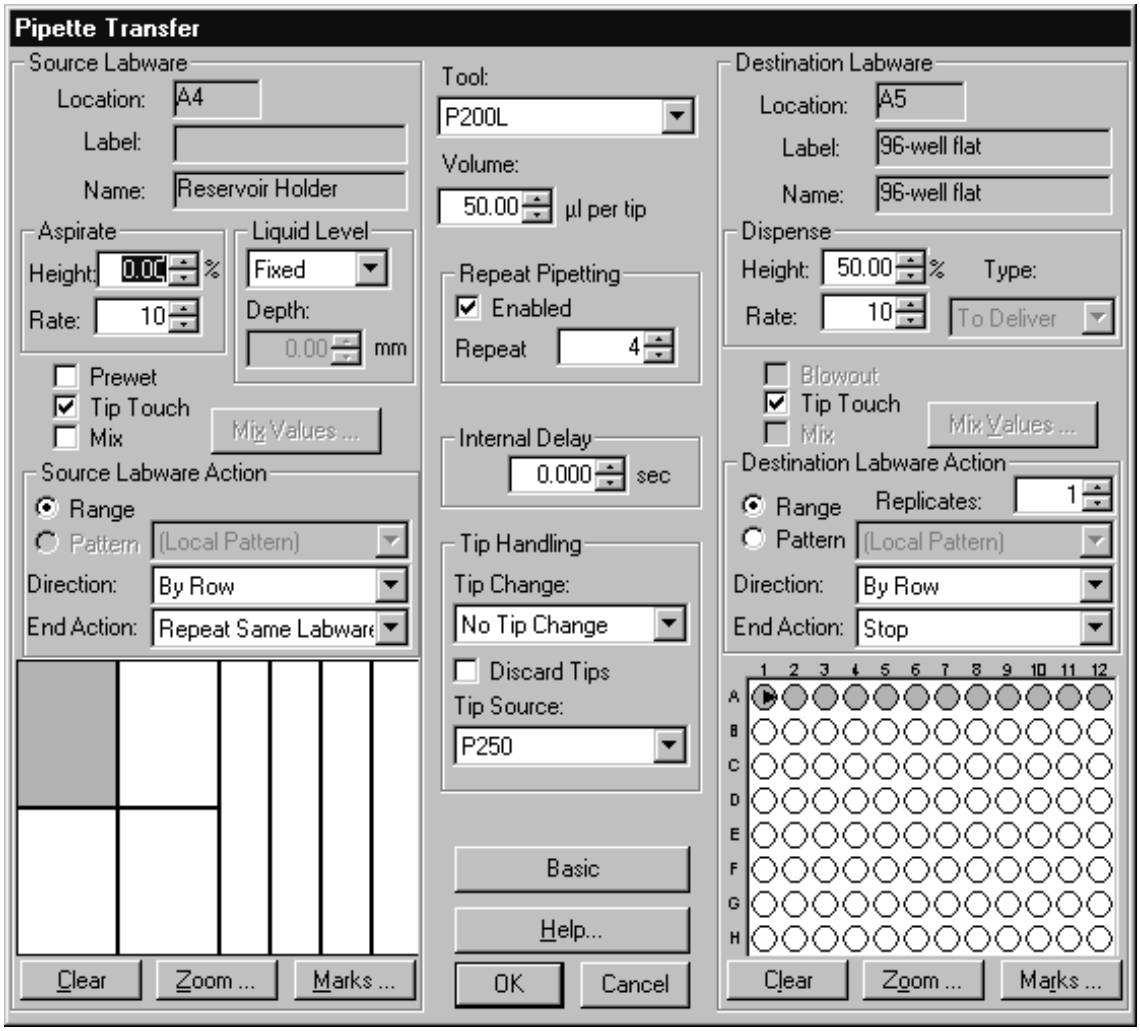


Click **Method** 1 and select **Open**.

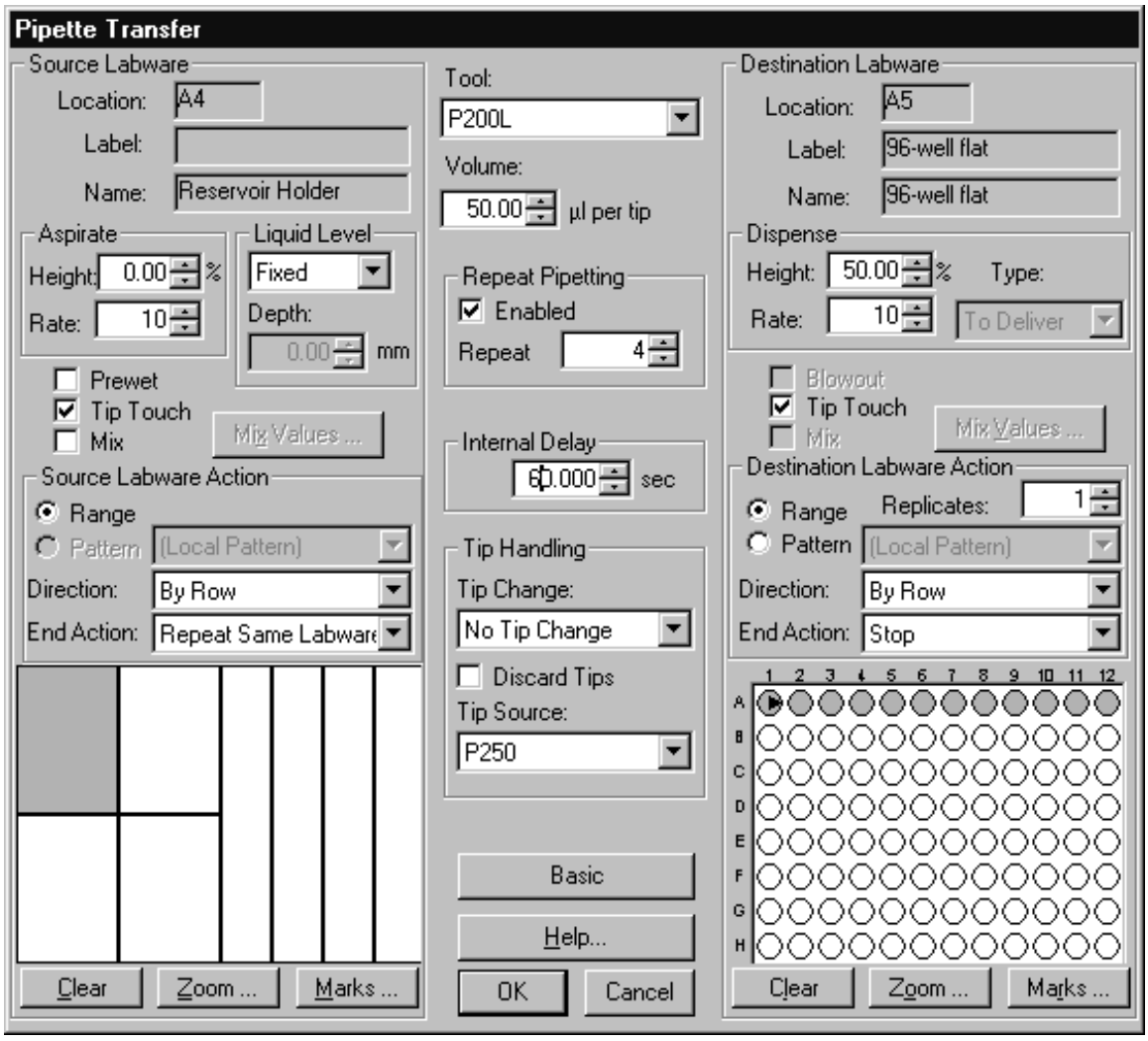
Double-click on **Pipette 50 µL from A4 to A5 using P200L-P250** on the Method list.



This will display the Pipette Transfer dialog.

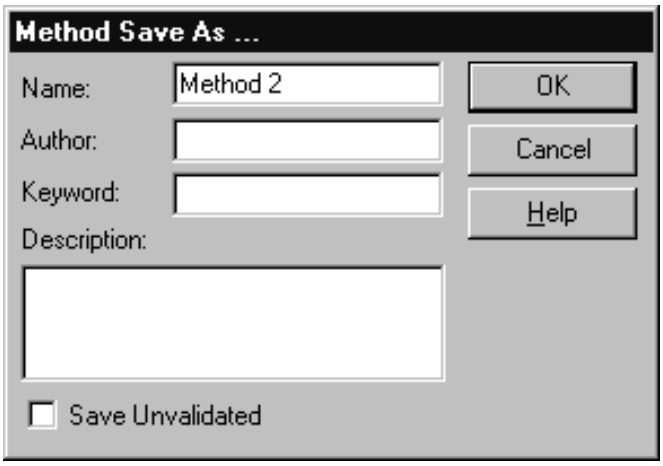


Click the **Advanced** button in the center section to display the Advanced options, if necessary. (They may already be displayed from the previous exercise.)

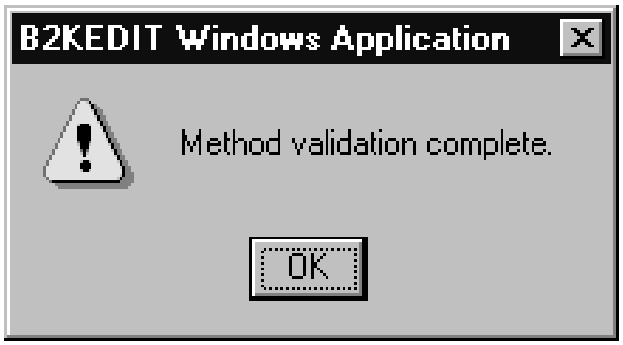


Enter an **Internal Delay** of **60.00** seconds. This delay will cause a 60 second pause between each dispense.

Click **OK** to save the change. Go to the Method menu and select **Save As**. Type in **"Method 2"**. The Save As window will appear as follows:

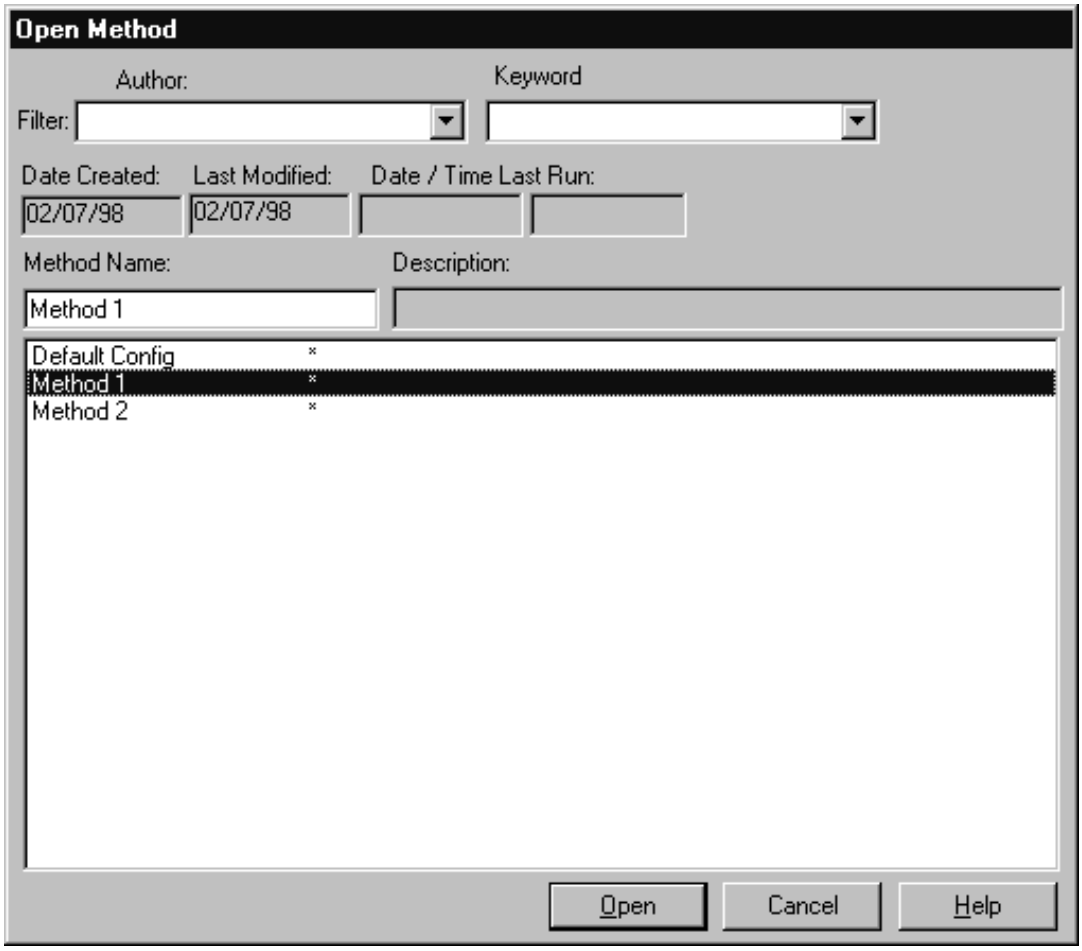


Click **OK** to save the method.

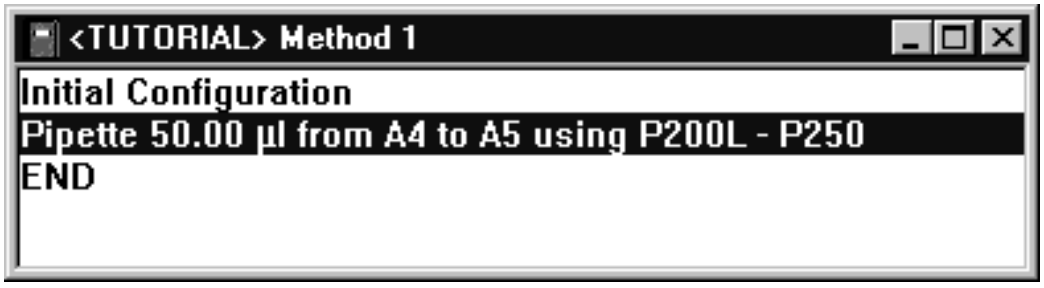


Click **OK** when the "Method Validation Complete" screen appears. Close the method by clicking on the **Method** menu and then click **Close**.

Move back to **Method** and **Open** and select **Method 1** and then click **Open**.

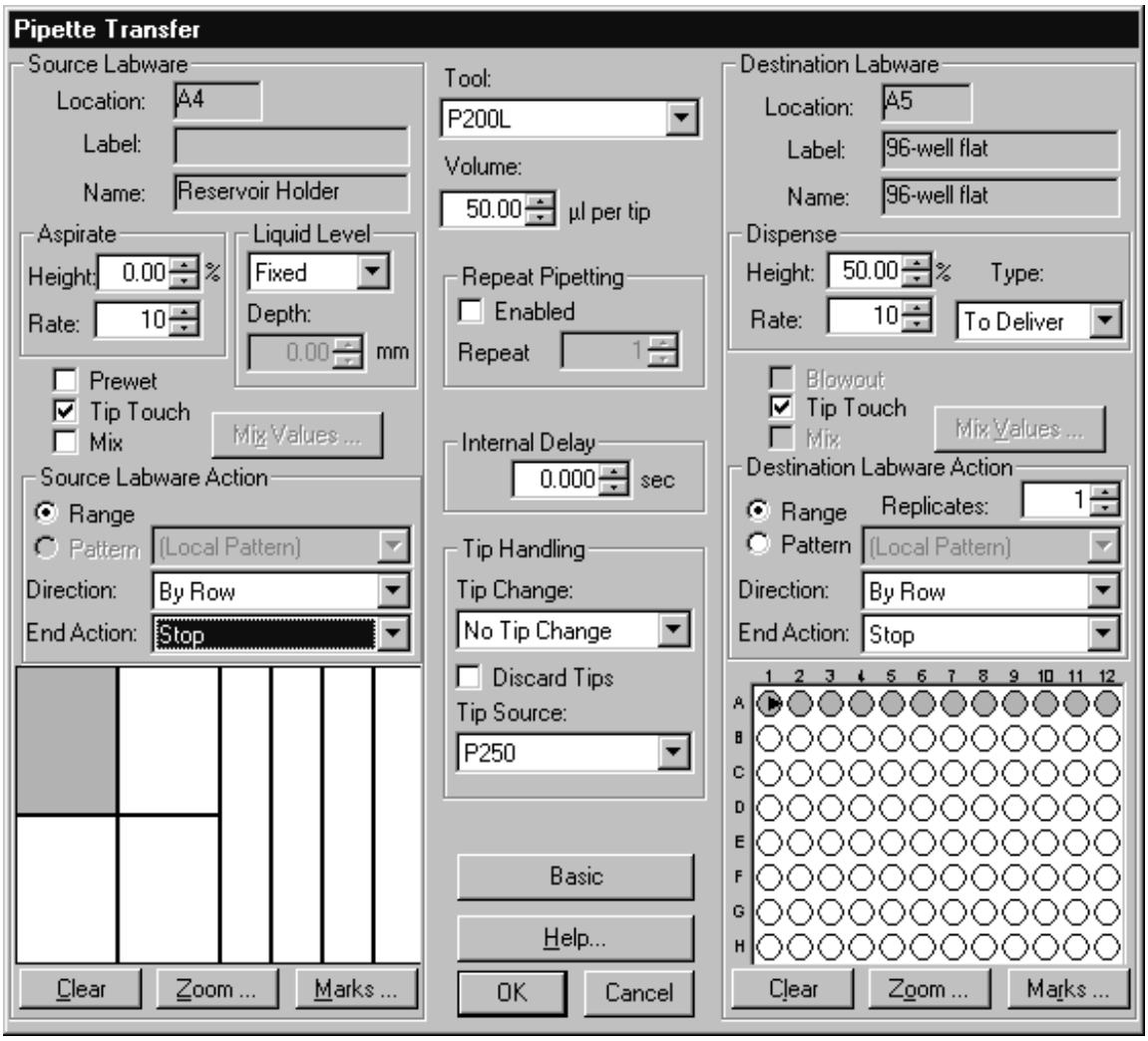


Double-click on **Pipette 50.00 µL from A4 to A5 using P200L-P250** on the Method list. You may need to move the Workstation and the Palette out of the way.



For Method 3, you must disable the Repeat Pipetting option so that the five minute pause can be placed between each dispense. (The "Internal Delay" feature of Repeat Pipetting only allows up to a 100 second delay, so it cannot be used in this method.)

Click **Repeat Pipetting Enabled** to remove the checkmark, and disable it. Change the Source Labware End Action to **Stop**.

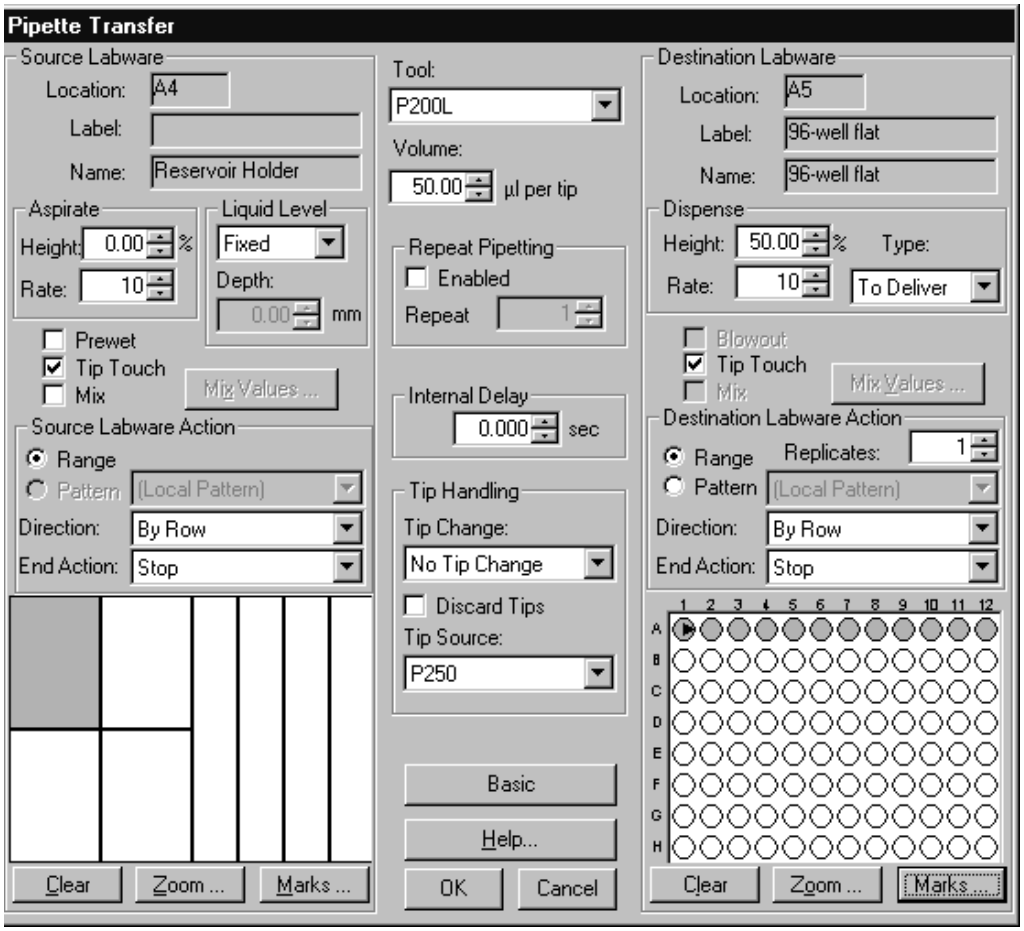


This will permit only one aspiration from the source for every dispense at the destination. Since the Pause Labware function will be used for the five minute pause, a mark must be placed after each destination dispense to identify its place. Each successive pipetting step will dispense to the marked well on the destination plate, and then move the mark to the next well in preparation for the next step.

Click the **Marks** button on the bottom right-hand corner of the Destination Labware section. The window will appear as follows:

Click **Use then set new mark** on the "Marks Usage" window and click **OK**.:

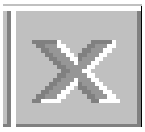
The pipette transfer window will look like this:



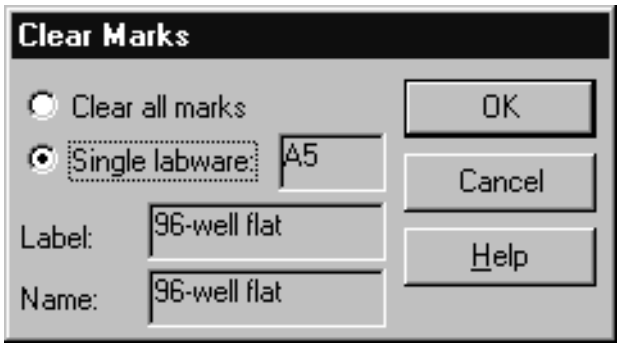
Click **OK** to save the "Pipette Transfer" window.

Since a mark is set on the "Pipette Transfer" window, a Clear Marks function should be inserted before the pipette transfer function in the Method List to erase any existing marks on that labware location.

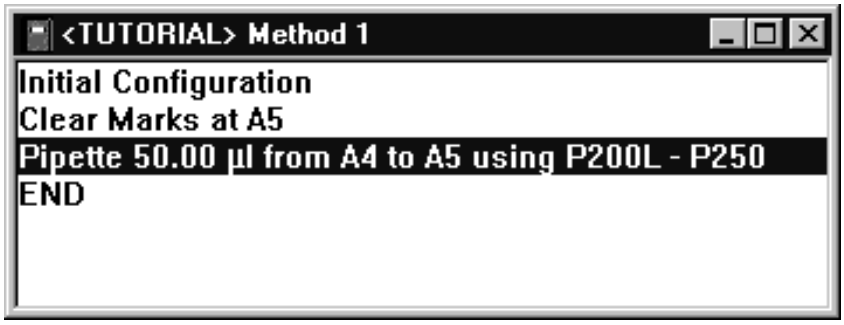
Highlight the line in the method which specifies the Pipette Transfer, then click the **Clear** Marks icon button on the Function Palette:



and move the cursor to position A5. Click position **A5**. The "Clear Marks" window appears as follows:



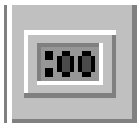
Choose **Single labware** to clear marks only on this piece of labware and click **OK**. Selecting Clear all marks clears marks on all locations. The Method list will appear as follows. Note that the new line is inserted above the highlighted line.



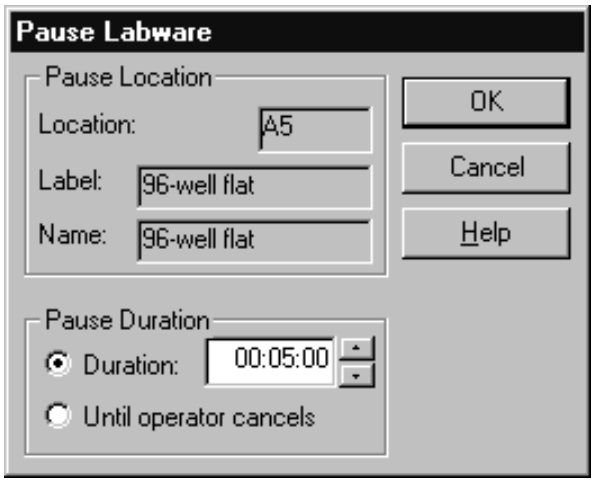
After completion of the clear marks, one 50 µL transfer will be made and the system will stop.

In order to pause five minutes after the transfer, a “Place a ‘Hold Until’ on a Piece of Labware” function should be added to the Method list. Highlight **End** on the Method list.

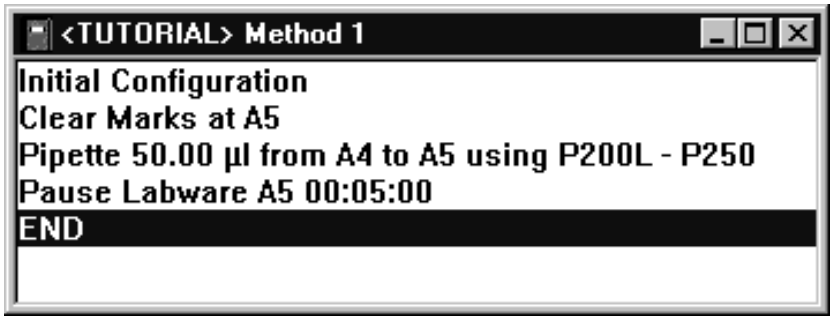
Click the Pause Labware icon button on the Function Palette, shown on the next page.



and select the labware **A5** with the stopwatch. The following window will appear:

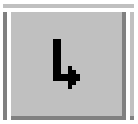


Click **Duration** and highlight the Duration field. Type **00:05:00** (use left and right arrows to select digits). Click **OK** to insert the function in the Method list. The Method list will appear as follows:

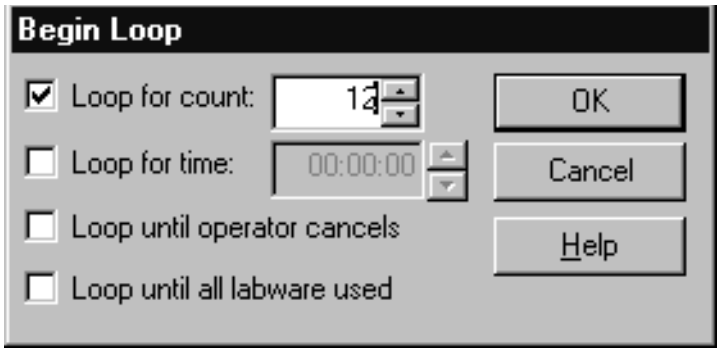


To specify the transfer from the reservoir to the first twelve wells of the 96-Well Flat plate, you can use a *loop* to repeat the Pipette Transfer function and the Pause Labware function. This can be achieved by inserting a “Loop” before the Pipette Transfer function with a count of 12 and inserting an End Loop before End on the method list. Do this as follows:

- To insert a loop, first highlight the pipette function on the method list to insert the loop before that function. Now click the **Begin Loop** icon button on the Function Palette.

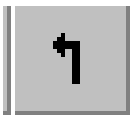


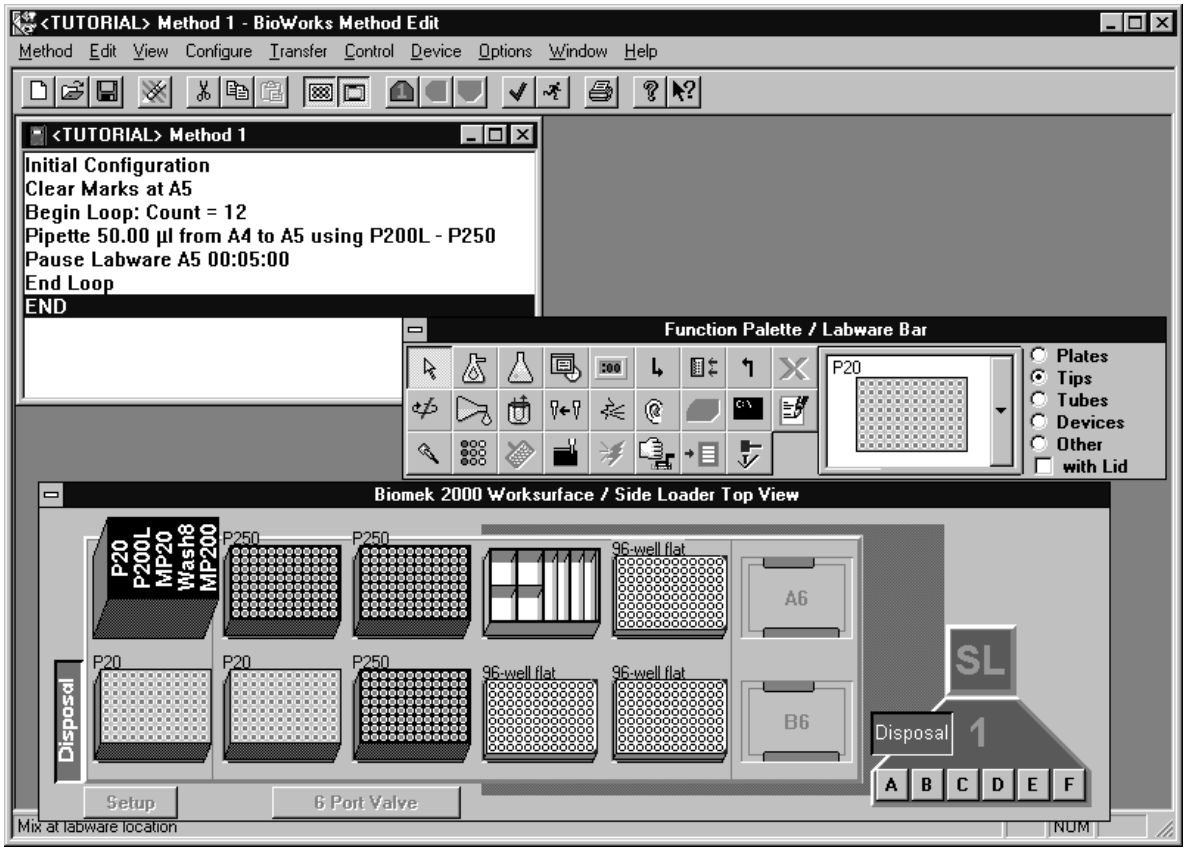
- Specify the loop in the dialog as follows:



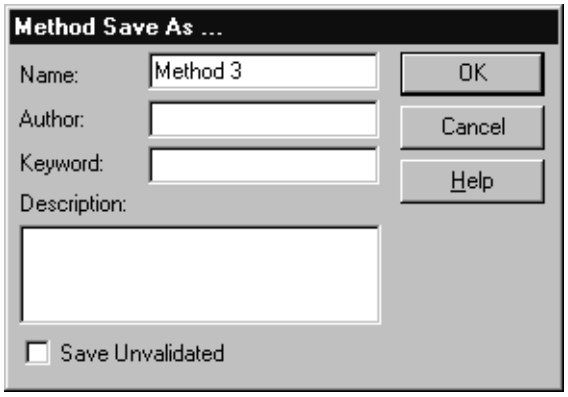
Click **Loop for Count** and click the up arrow to a count of **12**. (Alternatively, you could type in the number 12.) Click **OK** to insert this function into the Method list.

- To end the loop after the count of 12, highlight **End** on the Method list. Click the **End Loop** icon button on the Function Palette.





To save the method, click the **Method** menu and then select **Save As.**



Type in **Method 3** and click **OK**. The method will be validated and saved.

Click **OK** on the “Method Validation Complete” window.

You have now successfully completed Exercise 4!

Chapter Six 6

Exercise 5

Exercise 5: BioWorks Device Functions

In this exercise, you will use BioWorks Device Functions to control a Vacuum Valve Unit and to operate a Biomek Plate Reader. You will also use the Gripper Tool to handle labware and lids on the worksurface.

Note

This exercise utilizes the following accessories (i.e., Gripper Tool, Plate Reader, and 96-Filtration System (vacuum manifold).

If you don't have all of this equipment, you may practice this exercise in the BioWorks Edit mode, but you will not be able to run the method created.

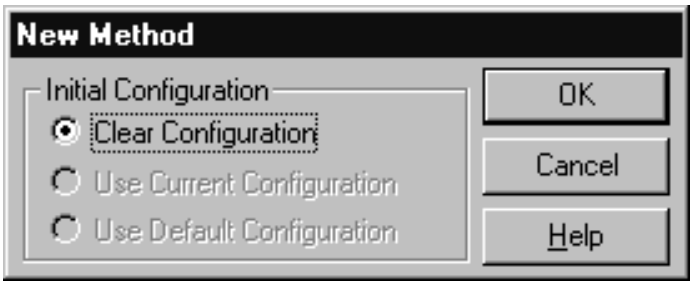
Task

In this exercise, you will create a method to do the following:

- Remove the lids from the labware and tip racks on the worksurface
- Place a Vacuum collar and a filter plate on the Vacuum Manifold
- Perform a pipette transfer to the filter plate on the vacuum manifold
- Aspirate the filter plate to collect sample into a 96-well flat plate
- Move the 96-well flat plate to the Plate Reader and take readings

Open a New Method and Set the Initial Configuration

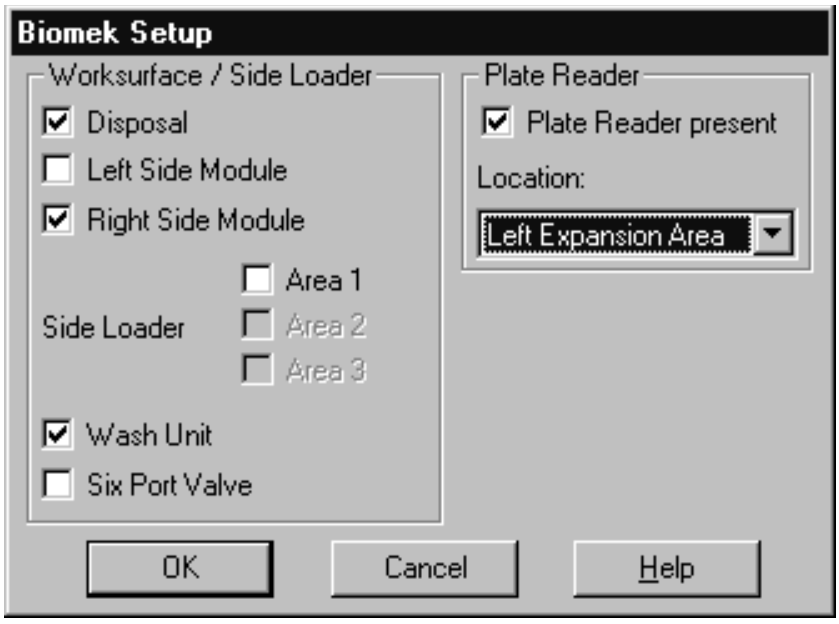
Begin by closing any open methods. Then select **Method/New** from the command bar. Select **Clear Configuration** to start with a clear worksurface for this method, then click **OK**:



Click the **Setup** button on the worksurface to display the Setup dialog. Select the following options:

- **Disposal** unit enabled
- **Left Side Module** not present
- **Right Side Module** present
- **Plate Reader** installed on the Left Expansion Area
- **Wash Unit** present

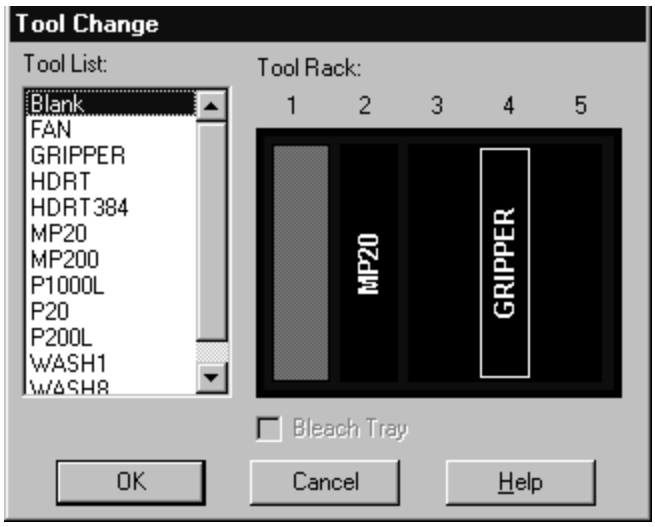
The Setup dialog should look like the one shown below:



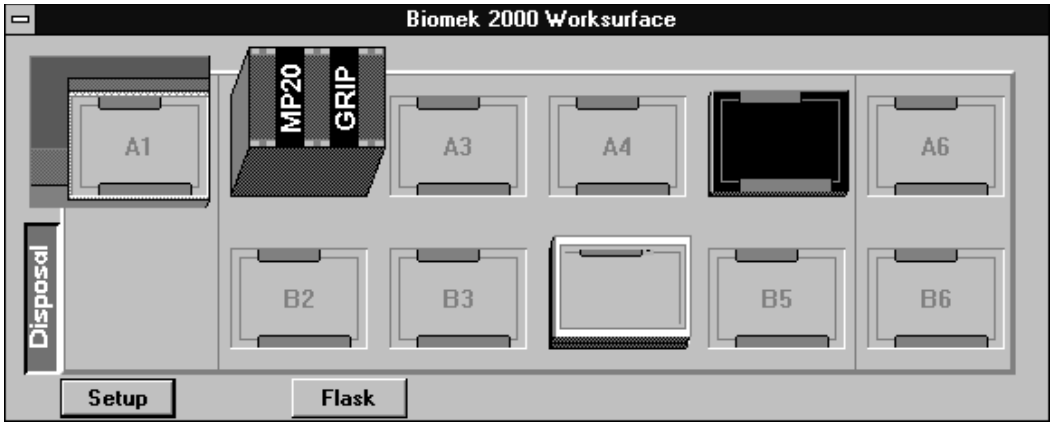
Click **OK** when done.

Highlight the Initial Configuration line in the method list window, and establish the configuration as follows:

Select the **Tool Rack** from the **Other** option on the Labware Bar, and click position **A2**. Place a **Gripper Tool** and an **MP20** tool in the rack, as shown on the next page.

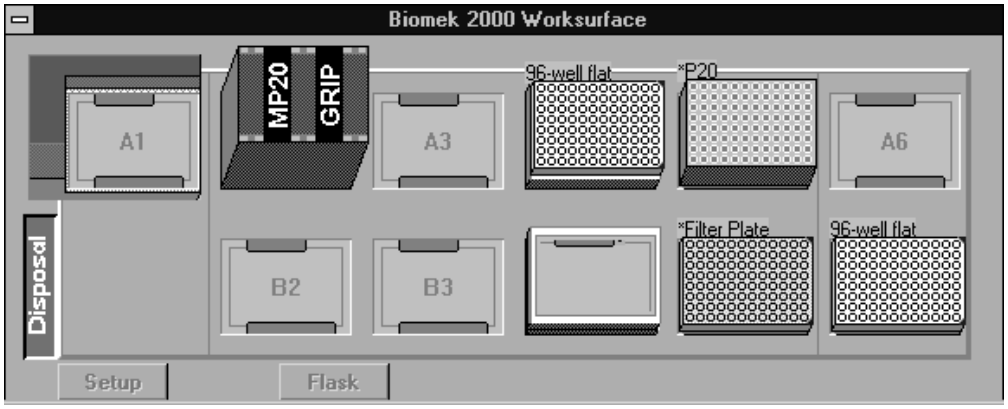


Click **OK** to place the Tool Rack on the worksurface. The worksurface looks like this:



Next, select the following devices from the Devices list in the Labware Bar, and place them on the worksurface:

- **Vacuum Manifold** at position **A4**
- **Collar Holder** at position **B4**
- **Vacuum Collar (std)** on top of the Collar Holder at **B4**
- **Tip Rack Holder** at position **A5**

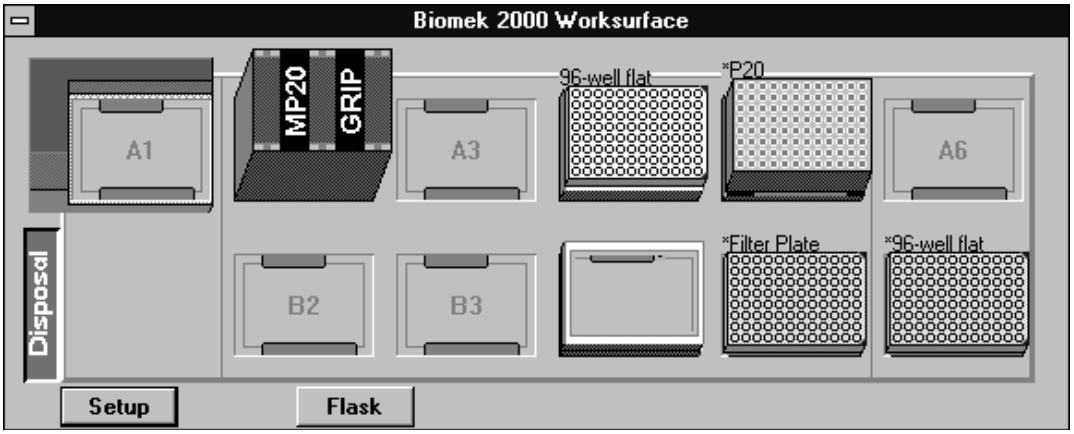


Next, select the following plates from the Plates list in the Labware Bar, and place them on the worksurface:

- **96-well flat plate** at position **A4** (on the Vacuum Manifold)
- **96-well flat plate with lid** (check the **With Lid** box on the Labware Bar) at position **B6**
- **Filter Plate with lid** at position **B5**

Select the **P20 Tip Rack** (with lid checked) from the Tips list in the labware bar and place it on the worksurface at position **A5.**

This configuration is shown below:

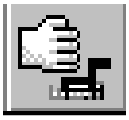


Note that the star * to the left of the labware and tip rack names means a lid is present.

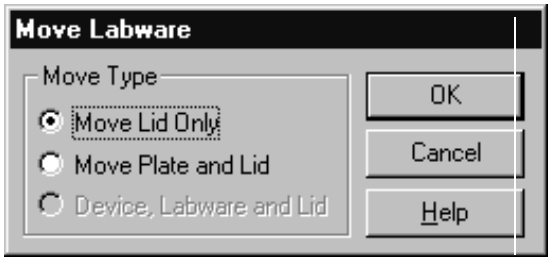
You have now established a new Initial Configuration. Highlight the **End** command in the Method Window to begin adding moves and transfer steps to the method.

Remove Lids to the Disposal

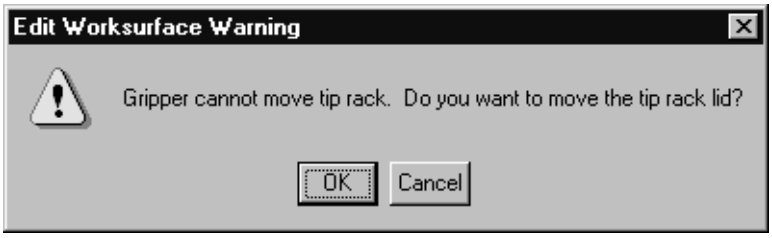
Use the **Move Labware** icon on the Function Palette (shown below) to perform each of the labware moves required for the method.



To move the lid (on the 96-well flat plate) to the Disposal click the **Move Labware** icon, click position **B6**, then click the **Disposal**. Because the Gripper can move either the lid, or the plate with the lid, the following dialog appears so you can provide specific instructions.

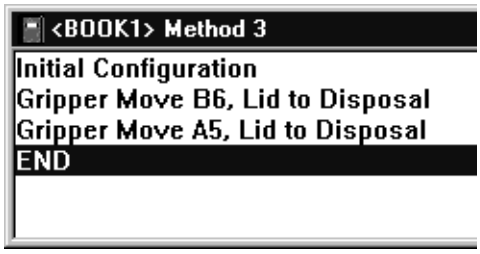


Select **Move Lid Only**, then click **OK.** Then move the Tip Rack Lid at A5 to the Disposal, as well. You will see the following message because the Gripper cannot be used to move a Tip Rack, but it can be used to move the lid. Click **OK**.



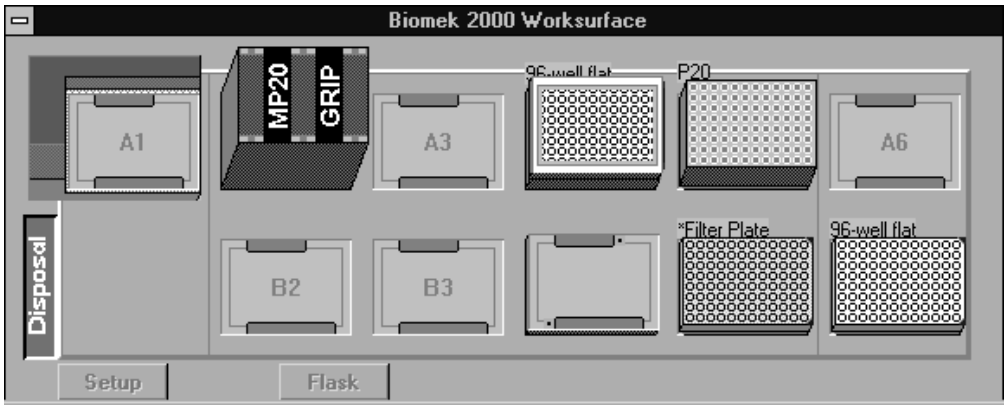
Then click the Disposal.

The Method window now looks like this:



Use the **Move Labware** icon button to move the collar (at location B4) to the manifold at position A4.

The worksurface window now looks like the following screen.



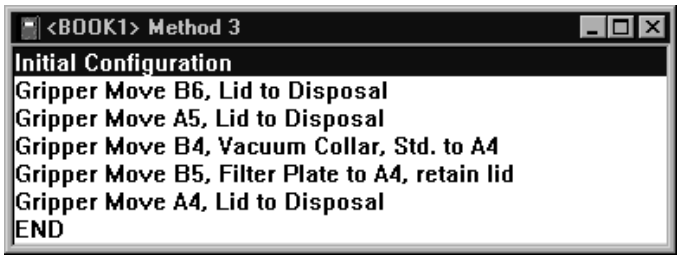
Move the Filter Plate (at location B5) to the Vacuum Manifold at location A4.

Move the lid only (for the filterplate at A4) to the disposal.

You can click location A4 with the right mouse button to display a list of the labware layered at this location. You should now have the following labware at this location:

- Filter Plate
- Vacuum Collar, Std.
- 96-well flat
- Vacuum Manifold

The method screen should look like this:



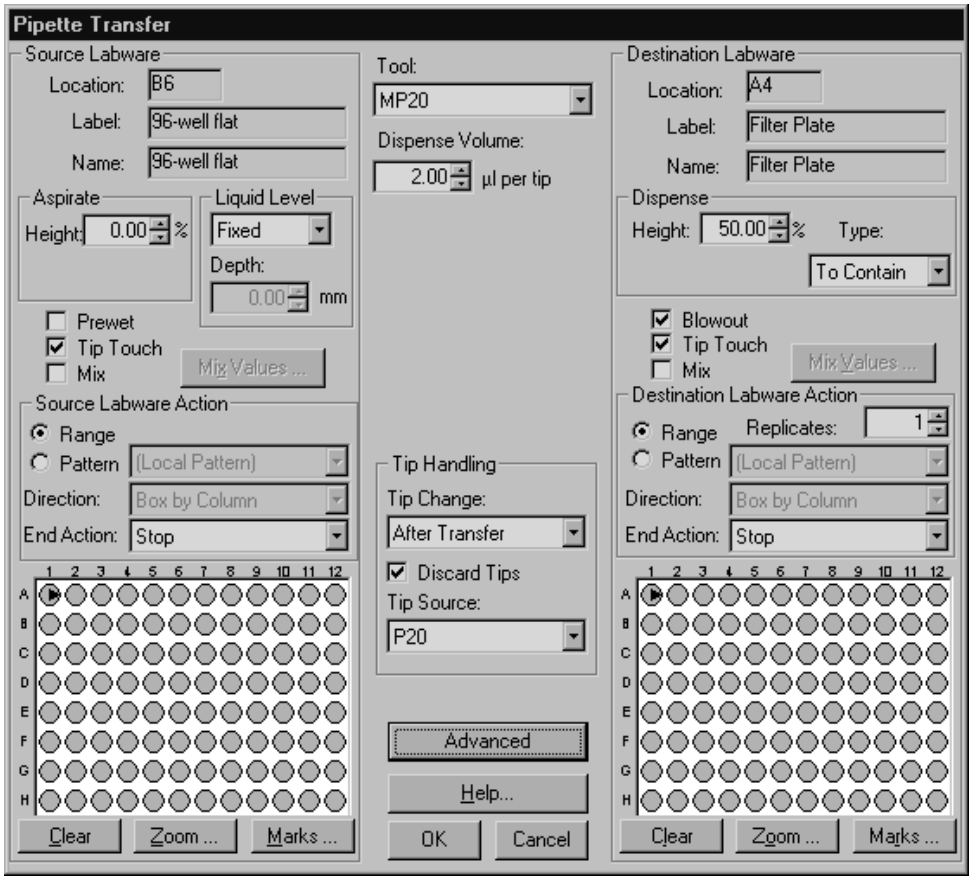
Pipette Transfer

Now, use the Pipette icon button to add a Pipette Transfer from the plate at B6 to the filter plate at A4:

Click the **Pipette** icon button, click position **B6** for the source, then click position **A4** as the destination. When the Pipette Transfer dialog is displayed, verify that the correct tool and tips are selected, then configure the transfer as follows:

- Select all wells in source and destination.
- Select **Tip Touch** at the source and destination
- Set the **Volume** to **2.00**
- Select **Blowout** at the destination
- Select a **Dispense Height** of **50%** for the destination, to ensure that the tips do not go too deeply into the filter plate
- Select the source and destination **Labware Action** as a **Range**, and an end action of **Stop**.
- Set the **Tip Handling** to **Tip Change After Transfer** and enable **Discard Tips**

The Pipette Transfer dialog should look like the one shown on the next page.

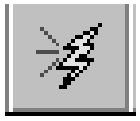


After selecting the parameters for the Source Labware and Destination Labware, click and drag on the wells in which the pipetting should take place. In the example above, the “click and drag” selection was done for wells A1 through H12.

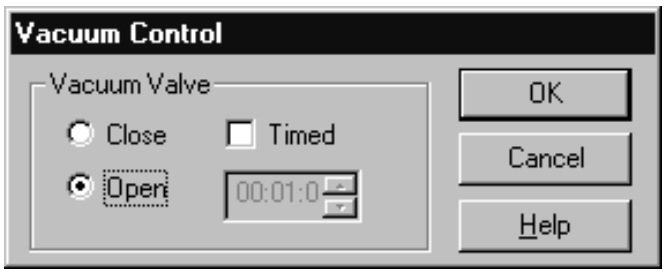
Click **OK** to accept the transfer configuration.

Controlling the Vacuum Manifold with a Device Function

Now, insert a control function in the method to turn on the Vacuum Manifold and aspirate the filter plate. For this, you will use the Device Control icon button on the Function Palette, shown below:

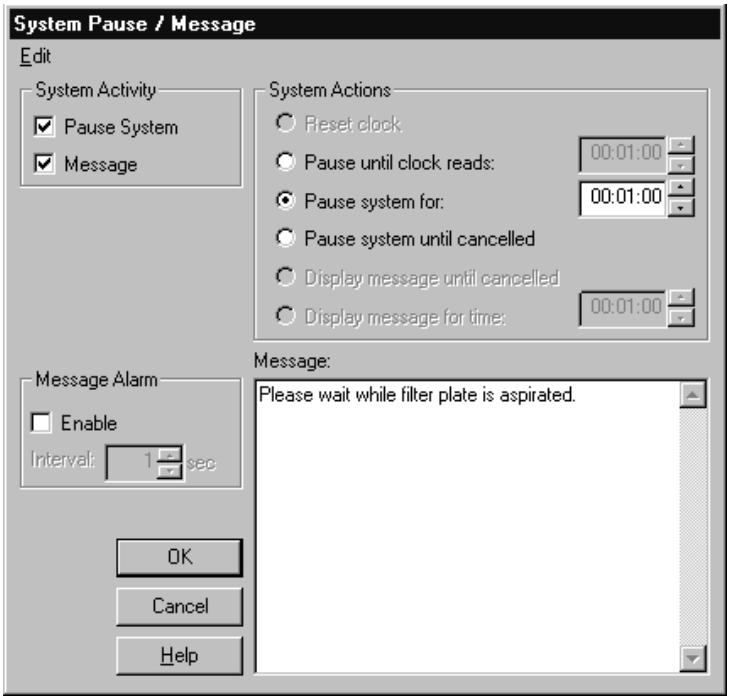


Click the **Device Control** icon button, then click location **A4**. Because there is a Vacuum Manifold device at this location, the Vacuum Control dialog appears. Select **Open** to open the valve and begin aspiration, then click **OK**.



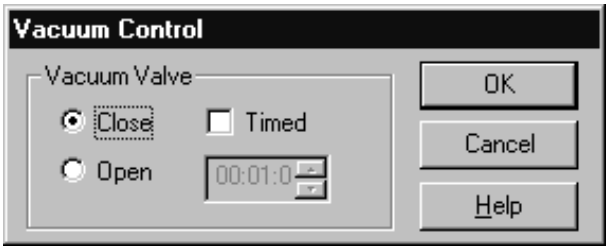
Next, insert a pause in the method to control the timing of the aspiration step. Click the **Pause** icon button on the Function Palette.

Set the Pause parameters, as shown below.



Click **OK.**

Then use the **Device Control** icon to insert another Vacuum Control step to close the Vacuum Valve.



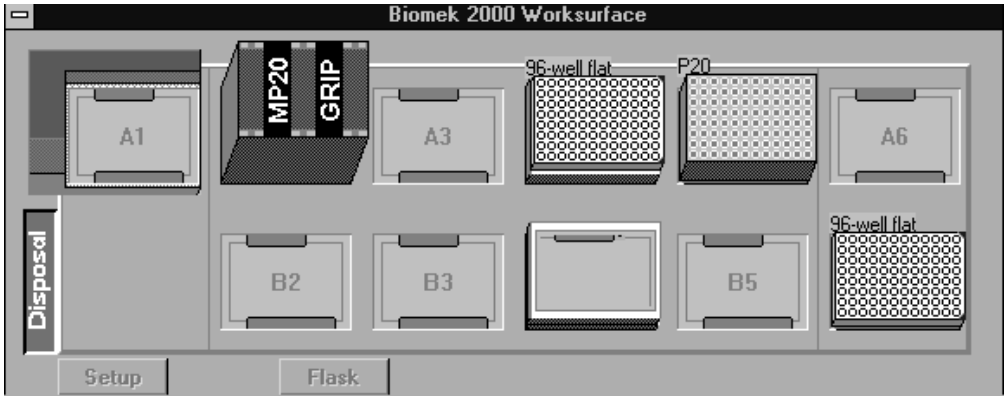
Click **OK** when done.

Remove Filter Plate

Now, we will use the move icon button to remove the filter plate from the manifold and put it in the Disposal..

Click the **Move Labware** icon, click at location A4, then click the **Disposal**. This will use the Gripper to dispose of the filter plate.

The worksurface should now look like the one shown below:

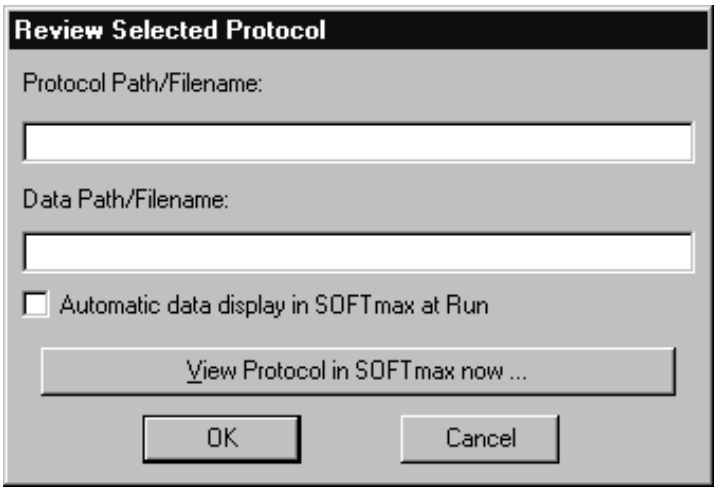


Move the Plate to the Plate Reader and Run Plate Reader Protocol

The final portion of the exercise will move the 96-well flat plate from the Vacuum Manifold to the Plate Reader, and take a reading on the plate using the Plate Reader icon button, on the Function Palette, shown on the next page.

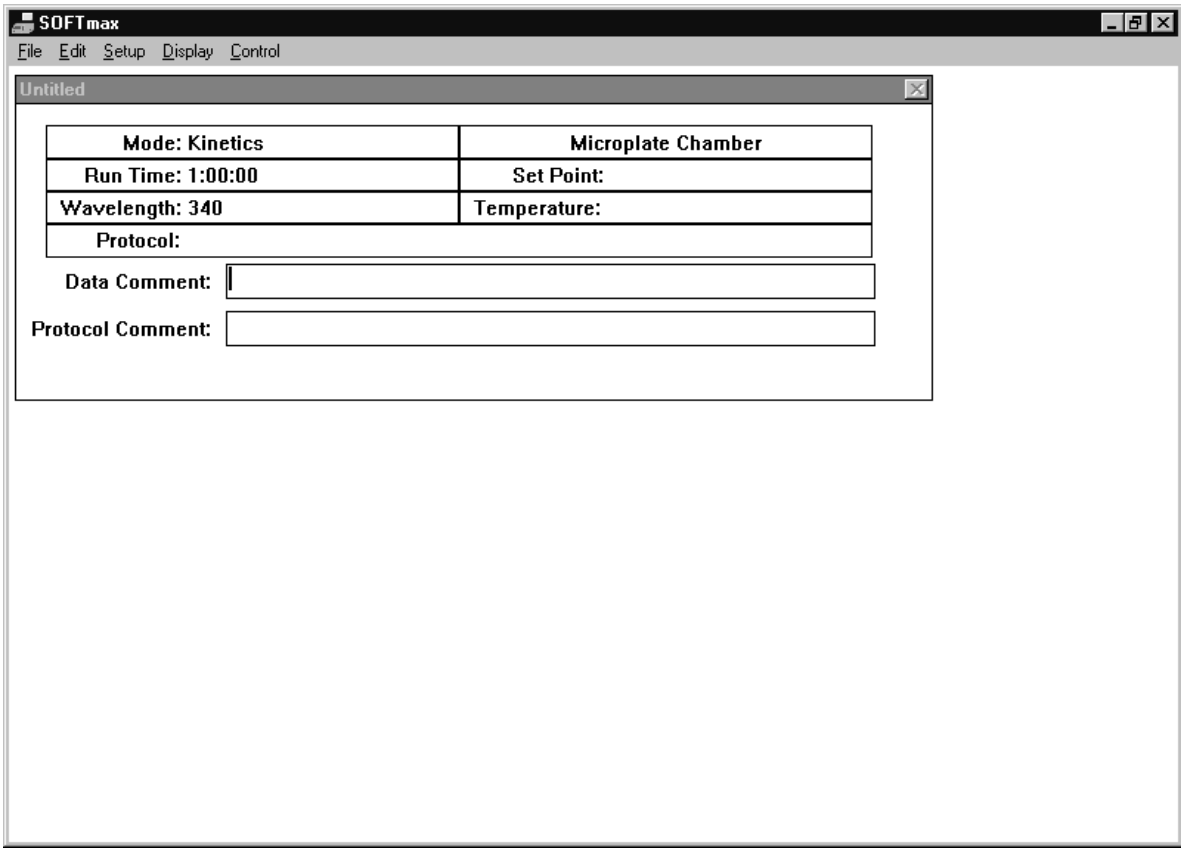
Click the **Move Labware** icon, click at position **A4**, then click the Plate Reader at **A1** as the destination. This moves the plate to the Plate Reader.

Next, click the **Plate Reader** icon to start the SOFTmax software for control of the Plate Reader.

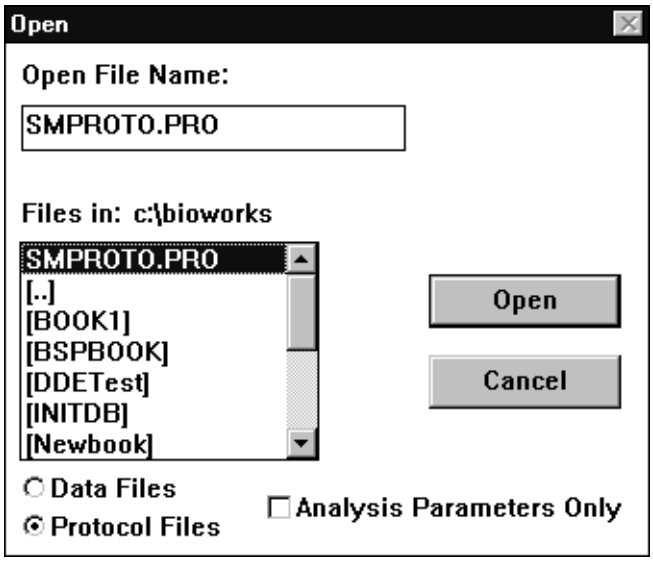


Click on "**View Protocol in SOFTmax now**" button. Click **OK** when you're finished.

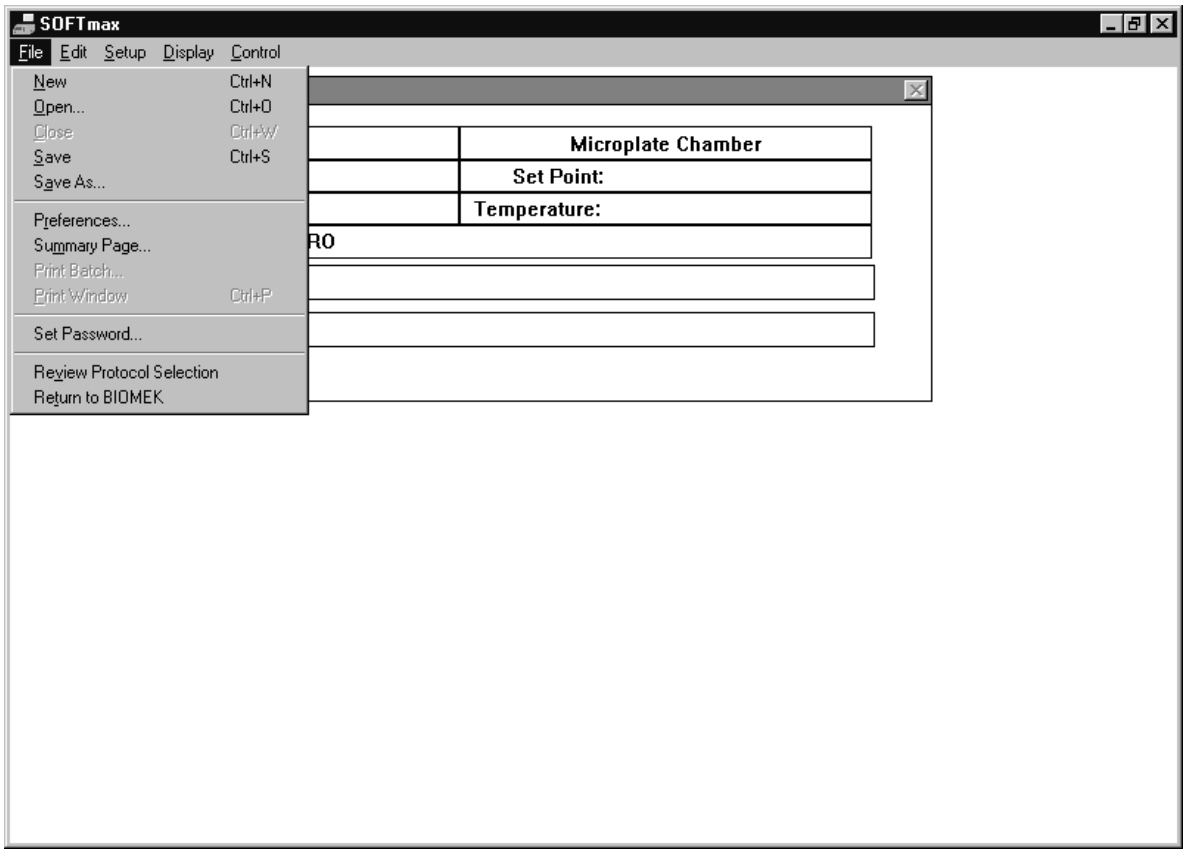
The SOFTmax screen is displayed, similar to the one shown on the next page.



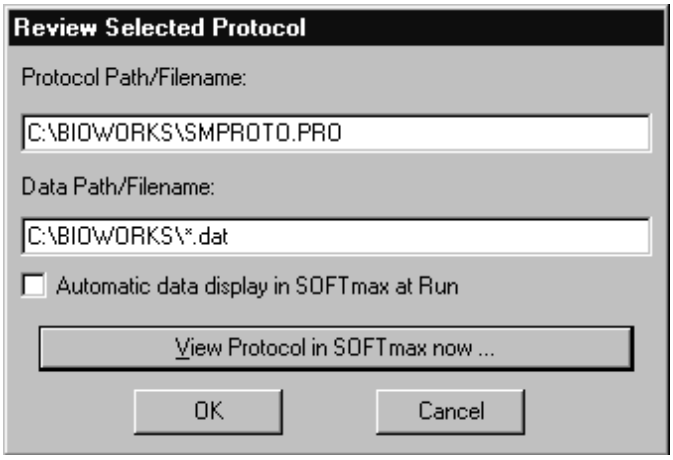
Select **File/Open** from the SOFTmax window. Click **Protocol Files** at the bottom of the Open dialog to display the protocol files, then select a protocol from the list shown. (The files on your system may vary.) Then click **Open**.



From the SOFTmax screen, select the **File/Return to BIOMEK** option.



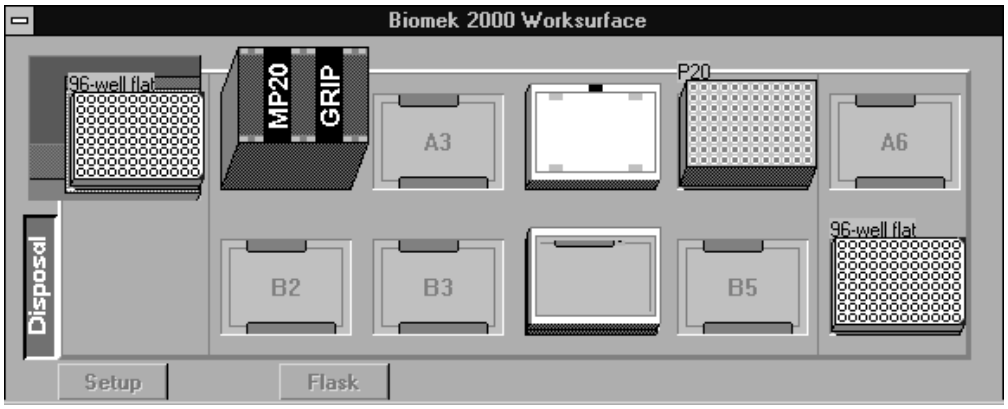
The selected protocol file and data file will be shown in the SOFTmax Review Selected Protocol dialog.



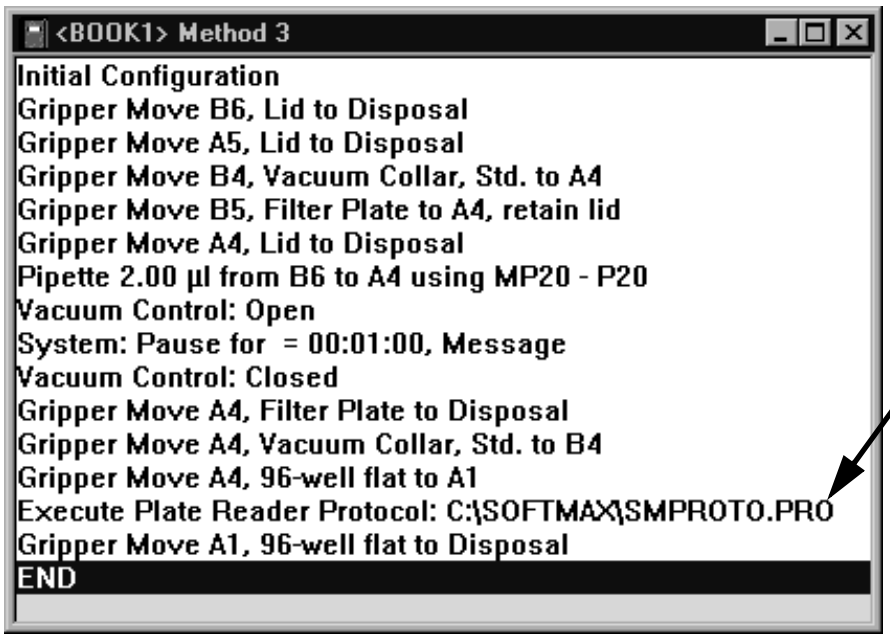
Click **OK** to accept the settings and return to BioWorks.

Resume here if you don't have SOFTmax.

You can now specify a move of the 96-well flat plate from the Plate Reader to the disposal by clicking the **Move Labware** icon, clicking on location **A1**, then clicking on the **disposal**. Your worksurface should look like the one shown below:

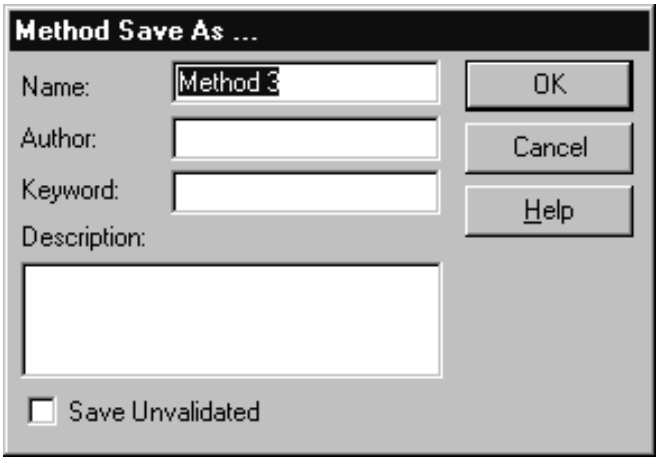


The Method Window should look like the one shown below:



This step will not be present if you skipped the SOFTmax steps.

Select Method/ Save.



Enter your preferred method name and click OK. The file will be automatically validated.

Click **OK**.

This completes Exercise 5.

Chapter Seven 7

Exercise 6

Exercise 6: Labware and Tool Edit

In this exercise, you will copy and edit labware and tool definitions from their respective libraries.

Labware Edit allows you to choose a piece of labware from the Labware Library and modify it to match specific labware that is not currently defined in the library.

Tool Edit allows you to modify the pipetting delays and overages for aspiration and dispense. The calibration slope and offset are also found on the Tool Edit window.

Once a labware or tool definition is copied, edited, and named, the new labware or tool definition becomes part of its respective library. The objectives of this exercise are to:

- Copy and edit a labware definition and place it on the Worksurface in the initial configuration of Method 1.
- Copy and edit a tool definition, then add it to Method 1.

Note

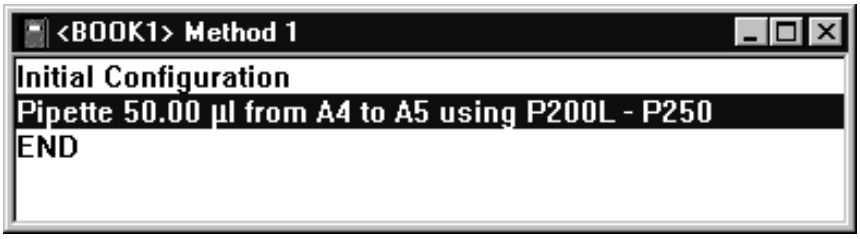
In order to protect the integrity of existing methods and the labware and tool libraries, you must copy labware and tools before you edit them. If you rename, edit (without first copying), or delete any labware or tool that is used in any method, a list of affected methods is displayed. If you choose to edit the labware or tool before copying, it will be changed in all the affected methods. If you delete or rename labware without first copying, the methods containing the labware are displayed. BioWorks will not permit you to delete or rename labware or tools until the affected methods are deleted, or modified so they do not include the labware.

Task

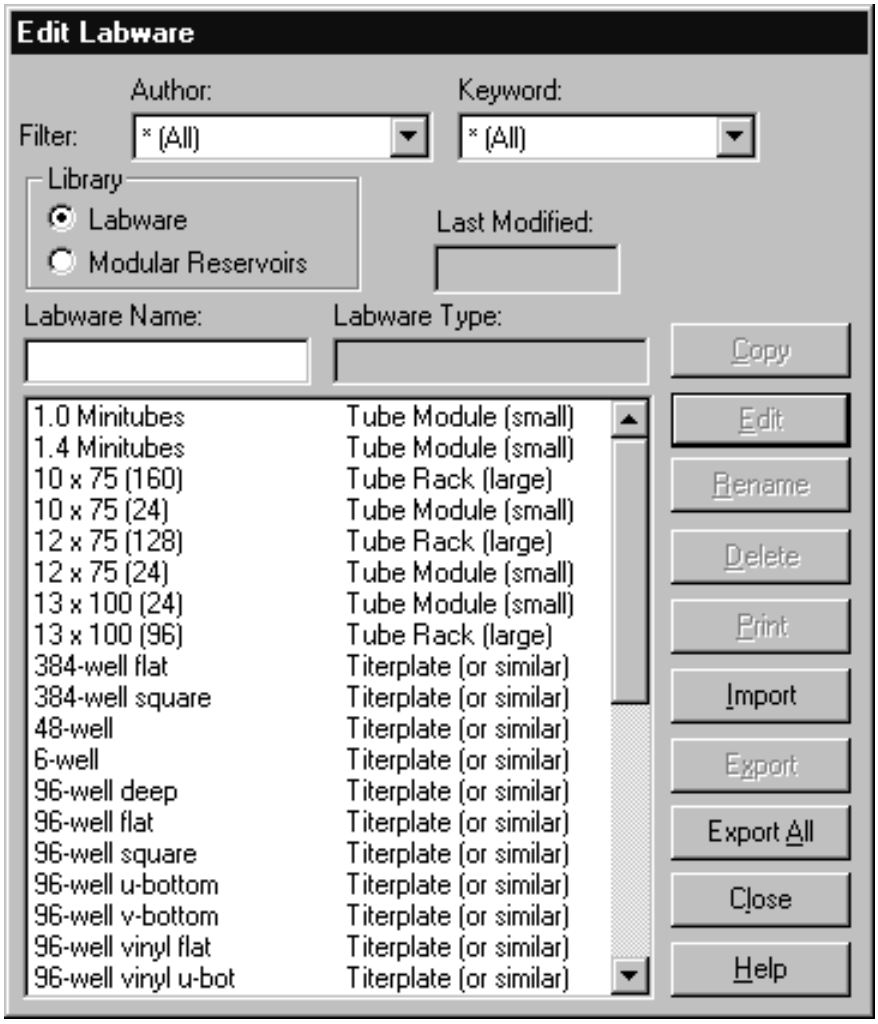
Create a new 96-well plate and a P200L tool definition for use with viscous liquids. Modify a method to perform a pipette transfer using the new tool and labware.

Labware Edit

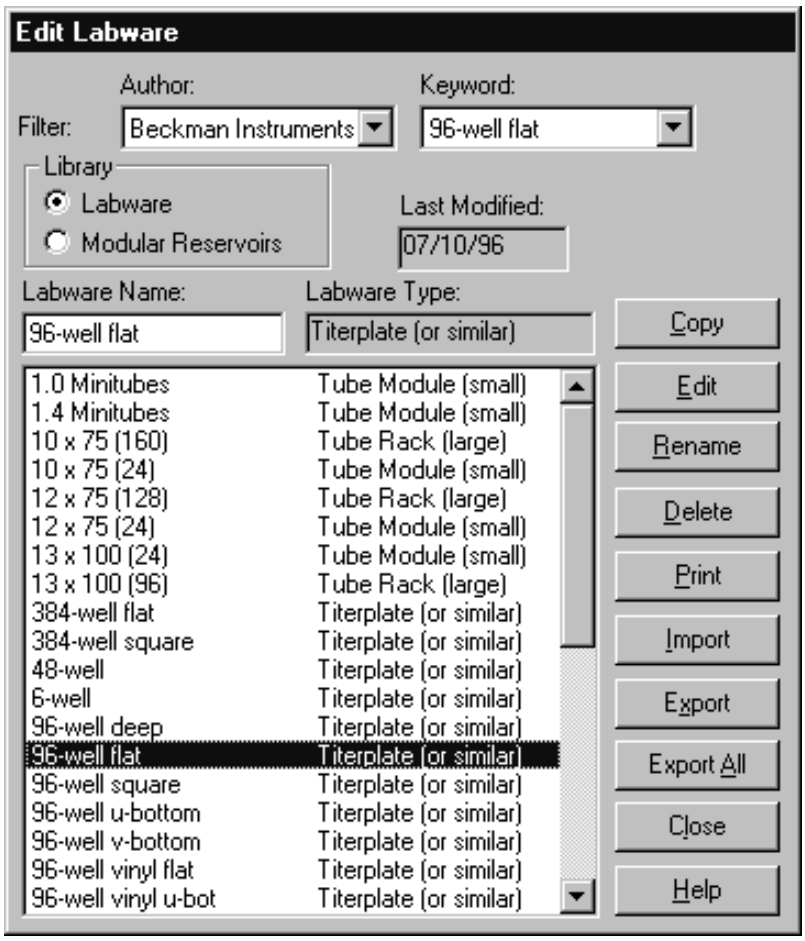
From the Method Menu, click **Close** to close any opened methods. Repeat as necessary. Click **Open** on the method menu, click **Method 1**, then click **Open**. Confirm that **Initial Configuration** is highlighted on the Method List. Since you will create a new piece of labware and a tool definition in the libraries, they must be created and utilized as part of the initial configuration. The method list will appear as follows:



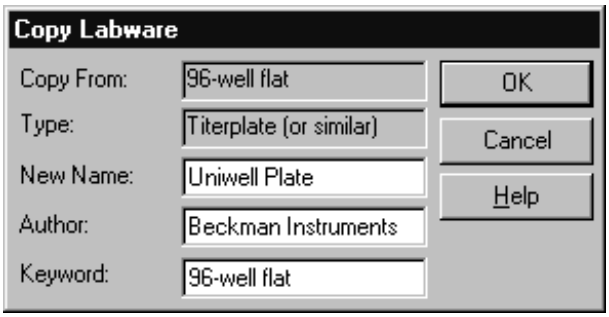
Click the **Edit** Menu and select **Labware**. The window will appear as follows:



In this exercise, we will modify a 96-well plate. From the Edit Labware window, click the labware name **96-well flat**, then click **Copy**:



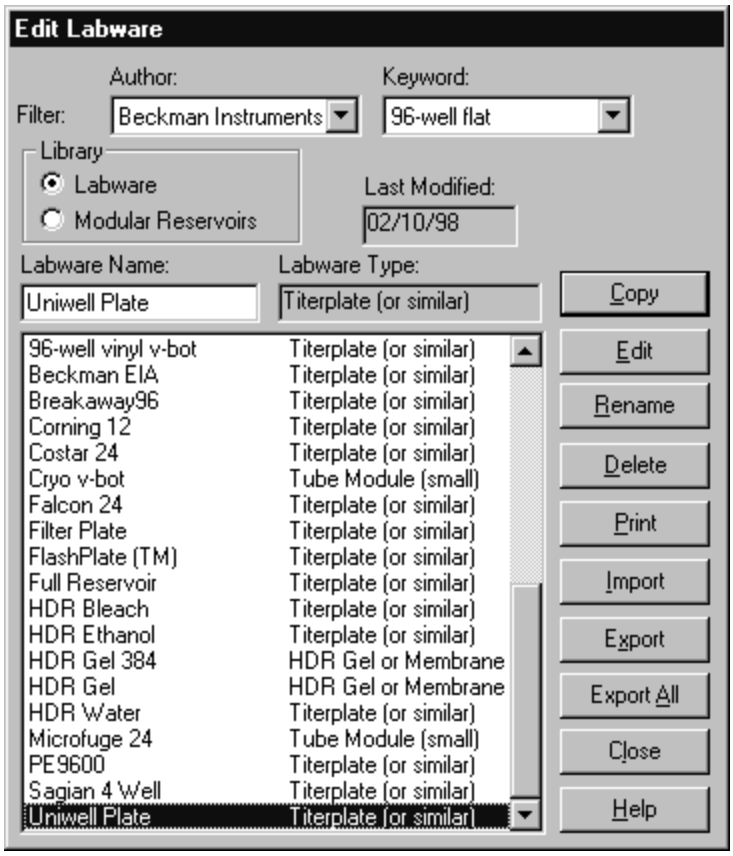
You will add a new style of 96-well plate to the Labware Library. The Uniwell* MicroPlate has flat wells with conical sides, and a slightly larger maximum value than the standard 96-well flat plate. In the Copy Labware window, type **Uniwell Plate** as the new name.



Click **OK** when done.

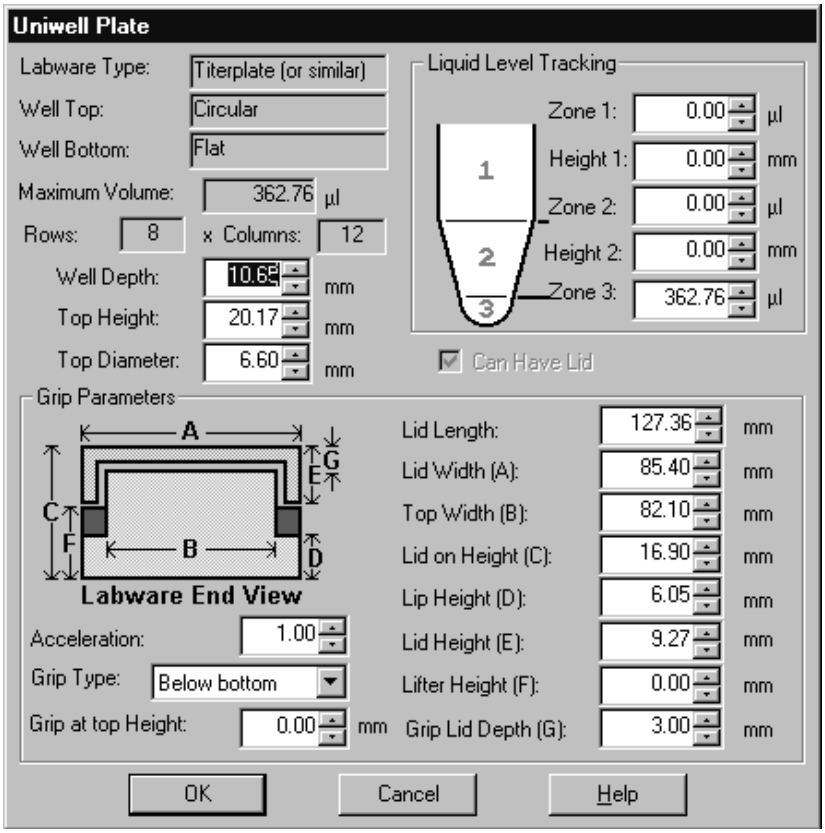
*Uniwell is a trademark of Elkay Products Inc.

The newly named labware is now part of the library. From the Edit Labware window, highlight **Uniwell Plate** (the numerically-named labware appear first; the rest of the labware is in alphabetical order):



Click **Edit**.

Now, you may customize the parameters of the Uniwell Plate.



As shown in the window, Labware Edit serves two functions: defining dimensions for gripping plates, and setting parameters for Liquid Level Tracking. Liquid Level Tracking (LLT) is an automatic calculation of aspirate height, based on an initial height and the liquid volumes subsequently removed from the wells. LLT is compatible with all Biomek 2000 pipetting tools, including tools with Liquid Level Sensing.

- Liquid Level Sensing (LLS) automatically detects the meniscus of the liquid with the sonic detector in the tool. Since LLS is available only in the P200L and P1000L Biomek 2000 tools, LLT offers the advantage of tracking liquid levels in non-sensing tools, such as the P20, MP20, and MP200 Biomek 2000 tools.
- In this exercise, the Liquid Level Tracking parameters will be utilized for purposes of creating a new labware definition. For more information on utilizing Liquid Level Tracking, please refer to the *BioWorks Software Reference Manual*.

To create a new labware definition, you must measure the labware's inner well depth, top height (including labware holder), and inner top diameter of the well. Assume that the following dimensions were obtained by measuring the plate:

Well Depth: 11.1 mm

Top Height: 20.17 mm

Top Diameter: 7.0 mm

If you are using a Gripper tool or Side Loader to automate lid and labware handling, you must also measure the dimensions for the grip parameters and edit them as needed:

Lip Height: 2.6 mm

Because the plate has a thin base and ridges at the sides, we will keep the Grip Type as "Below Bottom."

Note

The height of the labware includes the height of the labware holder. Beckman Labware Holder (Part No. 609120) has a top height of 5.37 mm. If you use a custom labware holder, you must measure the height of the holder and include it in the top height field.

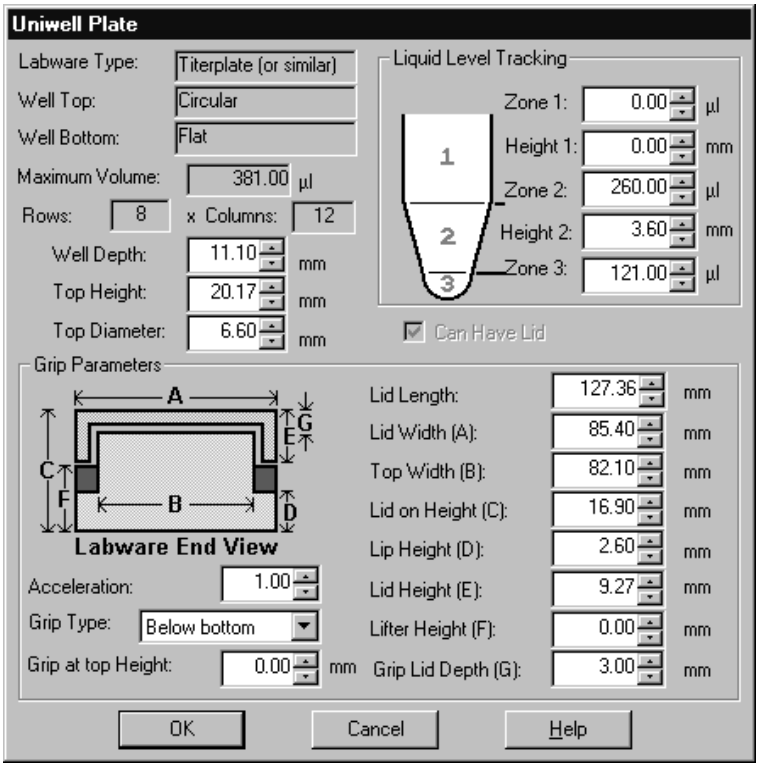
The sum of the Zones under Liquid Level Tracking equal the maximum volume of a well of the new labware definition.

Each well of the Uniwell Plate has two zones: a conical shaped zone with a flat bottom for the bottom third of the well, and a cylindrical shaped zone for the top two-thirds of the well. It is extremely important to consider the number of wells, well bottom type and well top shape when choosing a labware definition to copy. In this example, a 96-well flat definition was chosen because the Uniwell plate has 96 wells (8 rows x 12 columns), a circular well top, and a flat bottom. All labware definitions can accept different volumes by defining the heights and zones. You can determine the zone volume by pipetting up to each zone with a hand-held pipettor. Some labware manufacturers may have this information available on request.

The volume and height for each zone of the Uniwell Plate is:

Zone 1:	0
Height 1:	0 mm
Zone 2:	260
Height 2:	3.6 mm
Zone 3:	121

Type the zone and height values listed above, and the other labware measurements mentioned earlier, in the appropriate fields on the Edit Labware window.



Note that you can hold the mouse over any of the numeric fields to display the allowable range of values for that parameter.

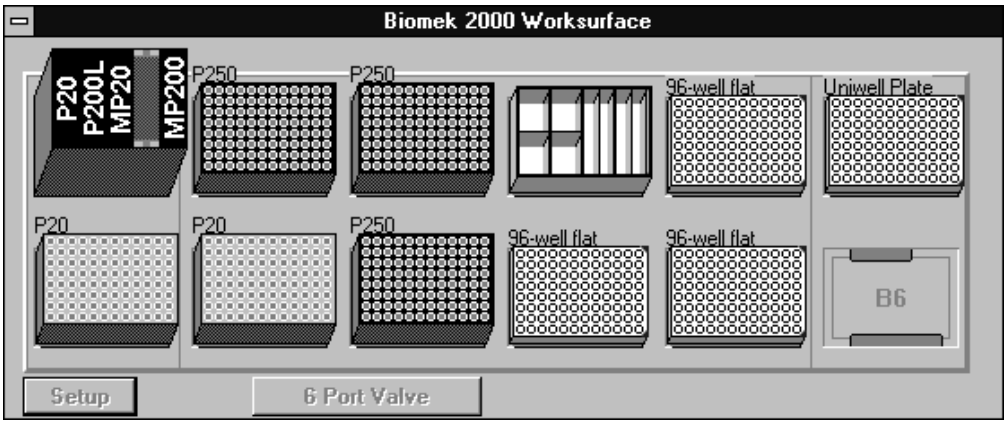
Click **OK**.

You have now created the Uniwell Plate labware definition as part of the labware library. In the Edit Labware menu, click **Close** to return to the BioWorks Edit window.

Click **Plates** on the Labware Bar, scroll down the menu and click **Uniwell Plate**.

Make sure the **With Lid** option is not enabled.

Click Worksurface position **A6**. The Worksurface will appear as follows:



Tool Edit

Tool editing allows you to modify tool parameters and define a new tool with a specific set of parameters. In a method, you may have several tool names based on a single tool type. For example, you may have a P200L tool on the Worksurface tool rack and use several different tool names based on that type. The tool names appear in the tool list on the Pipette Transfer and Mix windows.

When working with liquids of varying viscosities, optimizing pipette delays and overages increases pipetting accuracy. Tool definitions can be copied, modified and renamed for the following tools:

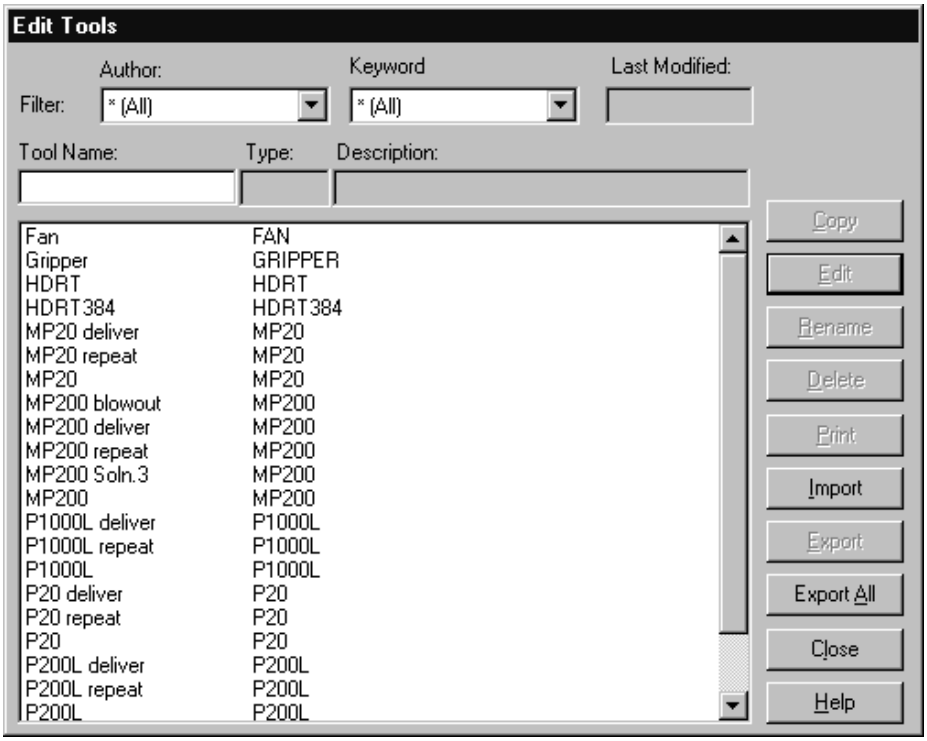
Table 1:

P20	MP20	Wash-1
P200L	MP200	Wash-8
P1000L		

The HDR tool does not contain any modifiable parameters. An HDR gel matrix is controlled under Labware Edit (HDR Gel).

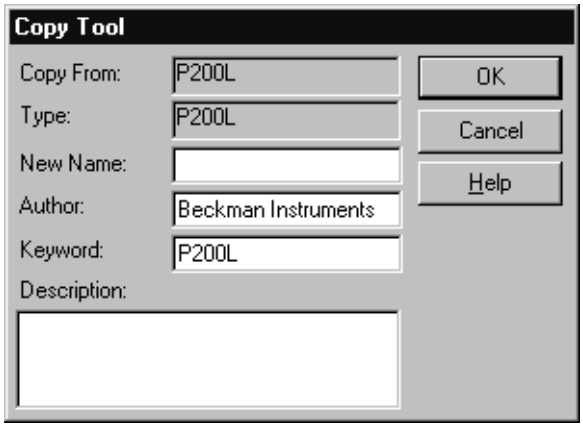
For specific instructions regarding modifying Wash Tools, refer to the *BioWorks Software Reference Manual*.

Click the **Edit** menu and click **Tools**. The following window will appear:

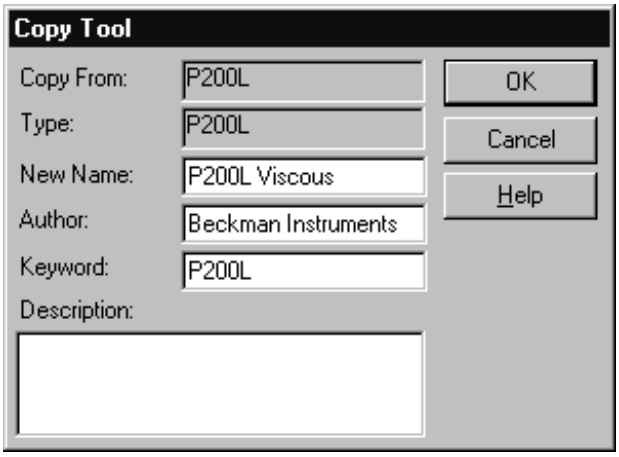


In this exercise, you will copy and create a new P200L tool for a viscous liquid.

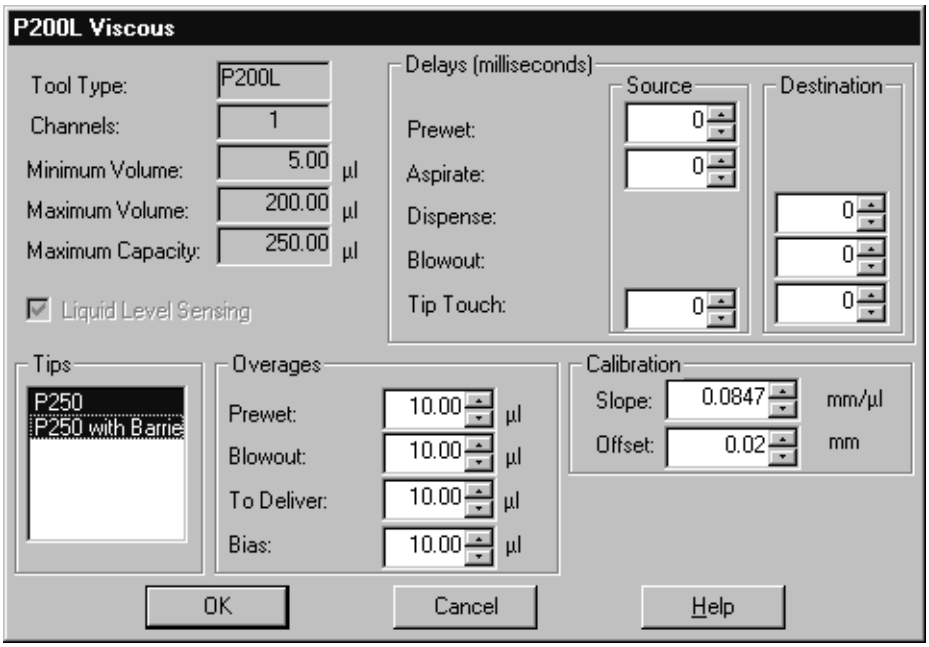
Click **P200L** and click **Copy**. The following window will appear:



On the following screen, type **P200L Viscous** and click **OK**.



In the Edit screen, click the new tool name, **P200L Viscous,** and click **Edit**. The following window will appear:



The tool type, number of channels, minimum and maximum volume, and maximum capacity are predefined values specific to that tool. The Tips field includes all possible tip choices for that tool. You can choose a specific tip to be used with that tool definition, if applicable. In this case, however, both tips are acceptable.

The Tool Delays are used to optimize the performance of a tool. Overages are volumes of liquid or air that assist in the transfer of a liquid. Definitions of these fields are found in the *BioWorks Software Reference Manual*.

To improve the pipetting performance for a viscous liquid, in this example you will enter values for Aspirate, Dispense, and Blowout delays, and a Blowout overage. Insert the following delays (in milliseconds) and overage in appropriate fields:

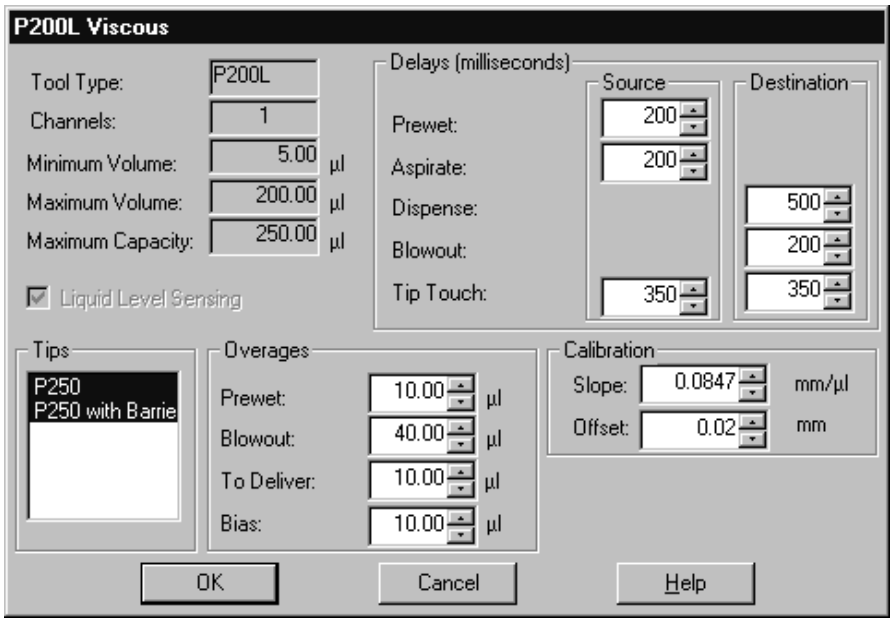
Table 2:

Parameter	**Source**	**Destination**
Prewet	200	
Aspirate	500	
Dispense		500
Blowout		200
Tip Touch	350	350
Overages:		
Blowout		40

Note

These values are for illustration only. For practical purposes, it is best to test each liquid and make the necessary modifications in Tool Edit.

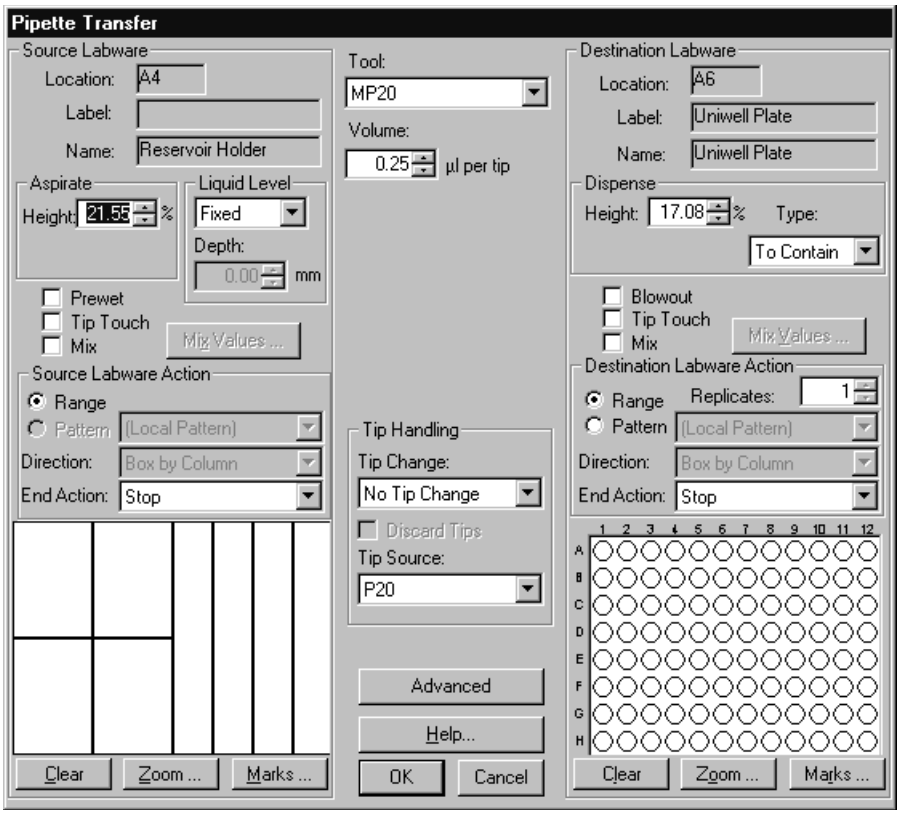
The window will appear as follows:



Click **OK**, then click **Close** in the Tool Edit screen. You are now ready to create a pipette transfer function using the new tool name into the new labware.

Highlight the last command ("End") in the Method Window of the method.

From the Function Palette, click the **Pipette** icon. Click the Reservoir in position **A4** and click the Uniwell Plate in position A6. The "Pipette Transfer" screen will appear:

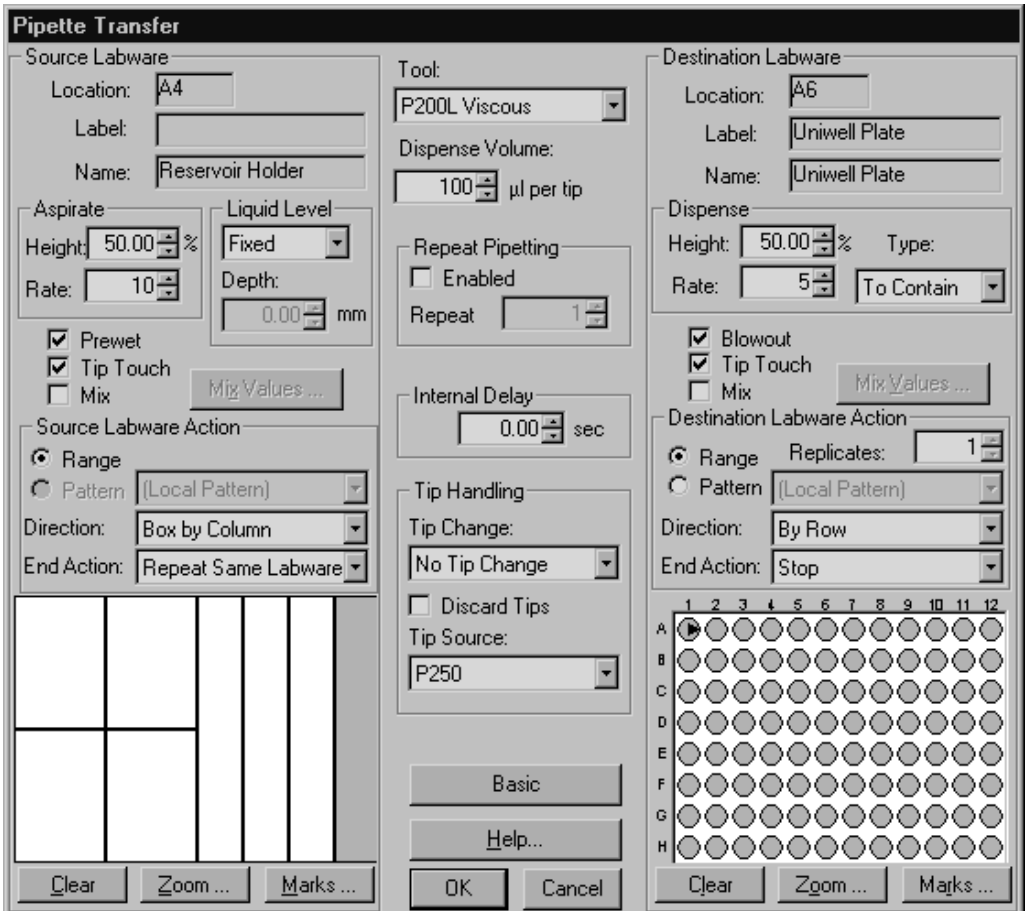


Click the **Tool** field and click the **P200L Viscous Tool**. Click the **Volume** field and type in a volume of **100 per tip**.

Choose the appropriate source and destination parameters to utilize the delays and overages chosen for this tool. Just above the source labware action section, click **Prewet** and **Tip Touch**. Set the Aspirate Height to **50.00%** so that the pipette tip will go to 50% of the height of the reservoir. Click the vertical quarter reservoir to the far right of the reservoir holder. Click **Repeat Same Labware** as the Source Labware End Action.

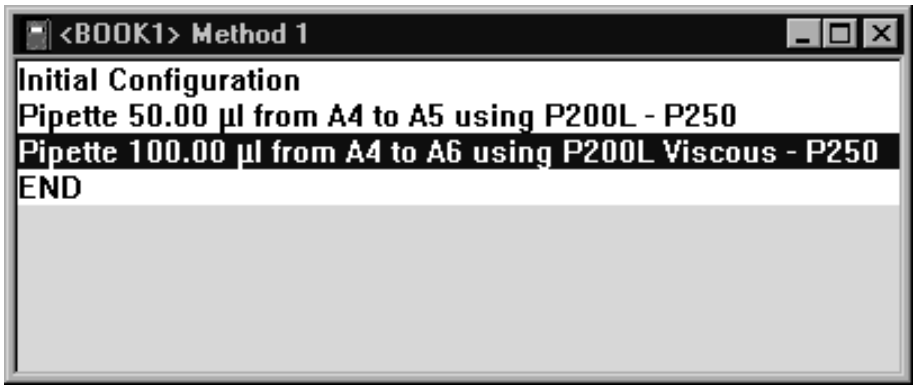
At the destination labware, set the Dispense Height to **50.00%** and the Type to **To Contain**. Select **Blowout** and **Tip Touch.** Set the Dispense Height to **50.00%.** In the Center Section, click **Advanced** to display extra menu items. To decrease the dispense rate from 10 to 5, click the Dispense Rate **down arrow** in the Right Section under Dispense until you reach "5". Click **Range** for the Destination Labware action. Select **By Row** for the Destination Labware Direction. Click and drag from well **A1 to H12,** so that the entire plate will receive liquid. Click **Stop** as the Destination Labware End Action.

The window will appear as follows:

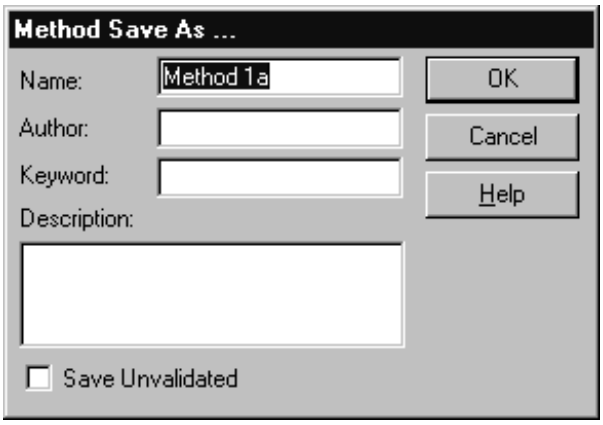


Click **OK**.

The Method window will appear as follows:



Click the **Method** Menu and select **Save As**. Type in **"Method 1A"**.



Click **OK.** The method will be validated and saved.

Click **OK.**

You have now successfully completed Exercise 6!

Chapter Eight 8

Summary

Congratulations, you have completed all of the tutorial exercises. Your familiarity with the basic functionality of the Biomek 2000 provides a solid foundation for solving your own laboratory automation challenges.